Ephemerides 756. a. 12

THE Gentleman's Diary;

OR THE

MATHEMATICAL REPOSITORY;

An ALMANACK

For the YEAR of our LORD 1762.

BEING

The SECOND after BISSEXTILE, or LEAP-YEAR.

Containing many useful and entertaining Particulars, peculiarly adapted to the ingenious Gentlemen engaged in the delightful Study and Practice of the MATHEMATICKS.

The Twenty-second *Almanack* published of this Kind; And the Tenth of the NEW STYLE in ENGLAND.

——— Quâ causâ argentea Phœbe
Passibus haud æquis graditur; cur subdita nulli
Hactenus Astronomo numerorum fræna recusat:
Cur remeant Nodi, curque Auges progrediuntur.
——— Quantis refluum vaga Cynthia pontum
Viribus impellit; dum fractis fluctibus ulvam
Deserit, ac Nautis suspectas nudat arenas,
Alternis vicibus suprema ad littora pulsans.

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ALL Perſons who are pleaſed to be *Contributors* to the DIARY, by anſwering the *Queſtions*, *Enigmas*, &c. or by ſending in new ones, or other *Subjects* proper for the WORK, are deſired to ſend *them* and their *Solutions* along with them, before the firſt Day of *May* 1762, directed for the *Author* of the GENTLEMAN's DIARY; to be left with THO. PEAT, School-maſter in NOTTINGHAM; (and where, &c.) *Poſt paid*, or they will not be received.

JANUARY hath xxxi Days.

Quarter the 3d Moon the 10th Quarter the 17th Moon the 25th	Day at	53 min. past Noon. 55 min. past 9 Morn. 41 min. past 2 Morn. 13 min. past 4 Morn.

M D	☉ Decl. South.
1	23° 1′
6	22 30
11	21 48
16	20 55
21	19 52
26	18 40

F	Circumcision; or New-Year's Day	10A	15	4A	42	8h	4′	3h	56′	11A	34
S	Day breaks, and Twil. ends at 6.	11	27	5	23	8	0	4	0	11	12
C	2 Sunday after Christmas	Morn		6	6	7	55	4	5	10	50
M	Days are now upon the Increase.	0	40	6	48	7	50	4	10	10	30
Tu	Old Christmas-Day.	1	57	7	36	7	43	4	17	10	15
W	Epiphany. Christ's ✶ app. Ger.	3	18	8	28	7	36	4	25	10	0
Th	(*Salisbury*, Wiltshire the 6th)	4	43	9	24						
F	Lucian, Priest & M.	6	11	10	28						
S	*Canterbury*.	7	30	11	35						
C	1 Sunday after Epiphany	Rises		Morn.							
M	Days increased 26 Minutes.	5A	19	0	38						
Tu	Old New-Years Day.	6	52	1	42						
W	Hillary, Bish. & Con.	8	22	2	41						
Th	Day 8 hours 16 min. long.	9	48	3	33						
F	*Nottingham*, for all Sorts of Cattle.	11	9	4	21						
S	*Hickford*, Lanc.	Morn.		5	7						
C	2 S. aft. Epiphany. Old Tw. Day.	0	27	5	52						
M	Prisca, Rom. V. & M.	1	45	6	37						
Tu	*Preston*, Lanc.	3	0	7	22						
W	Fabian B. of Rom. M. In 8 Days of	4	13	8	11						
Th	Agnes, Rom. V. & M. [St. Hil.	5	25	9	0						
F	Vinc. Span. Deac. M.	6	28	9	52						
S	Term begins.	7	19	10	43						
C	3 Sunday after Epiphany	7	57	11	33						
M	Conv. of St. Paul.	☽ Sets		0A	21						
Tu	Days increas'd an hour and 5 min.	5A	32	1	5						
W	From the Day of S. Hil. in 15 D.	6	44	1	49						
Th	Duration of Twilight 2 Hours.	7	55	2	31						
F	*Grampound*, Cornwall.	9	5	3	12						
S	K. Ch. I. Martyr'd, 1649.	10	18	3	53						
C	4 Sunday after Epiphany.	11	32	4	35						

☉ Rises	☉ Sets	☽ Sets	♃ Sets	♂ Rises	♀ Rises	☿ Rises	Cl. bef. ☉
8h 4′	3h 56′	11A 34	10 A 54	0M 22	6M 29	6 M 35	4 15′
8 0	4 0	11 12	10 35	0 15	6 38	6 55	6 31
7 55	4 5	10 50	10. 20	11A 0	6 45	7 7	8 36
7 50	4 10	10 30	10 0	11 50	6 50	7 15	10 25
7 43	4 17	10 15	9 54	11 40	6 54	7 20	11 58
7 36	4 25	10 0	9 30	11 30	6 56	7 30	13 10

FEBRUARY hath xxviii Days.

First Quarter the 2d	Day at	55 min. past 3	Morn.
Full Moon the 8th		9 min. past 8	Night.
Last Quarter the 15th		22 min. past 6	Night.
New Moon the 23d		52 min. past 10	Night.

M D	W D	Sundays, Holy and remarkable Days, Days Length & Incr. Terms, Fairs, &c.	☽ Rises & Sets,	
1	M	Day 9 hours 10 min. long. *Fast*	Morn.	
2	Tu	Candlemas Day, or P. B. V. M.	0	
3	W	Blazius, Bish & M. On Mor. Purif	2	
4	Th	Day breaks 25 min. past 5.	3	
5	F	Agatha, Sicil. V. & M.	4	
6	S	Day 9 hours 20 min. long.	6	
7	C	Septuagesima Sunday.	6	
8	M	Days increased 1 hour 52 min.	☽ Rises	
9	Tu	In eight Days of the Purif. B. V. M.	5 A	42
10	W	Day breaks 1 quarter past 5.	7	
11	Th	Day 9 hours 46 min. long.	8	
12	F	Term Ends.	10	
13	S	Old Candlemas-Day.	11	
14	C	Sexagesima Sunday. Valentine.	Morn.	
15	M	*Flint. Bromley*, Kent. *Blaise*, Corn	0	
16	Tu	Twilight ends 54 min. aft. 6.	1	
17	W	Day 10 h. 6 m. Night 13 h. 54 m. long.	3	
18	Th	*Nun-Eaton*, Warwickshire.	4	
19	F	*Beverly*, Yorkshire.	5	
20	S	Days increased 2 hours 37 min.	5	
21	C	Quinquages. or Shrove Sunday.	6	
22	M	*Norton*, Oxfordshire.	6	
23	Tu	*Godalming*, Surrey. *Fast.*	☽ Sets,	
24	W	Ash Wedn. St. Matthias, Ap. & M	5 A	4
25	Th	*Feversham*, Kent. *Llanfechel*, Angles.	6	57
26	F	*Oundle*, Northamptonshire.	8	
27	S	Day 10 hours 46 min. long.	9	23
28	C	Quadrages. 1 Sunday in Lent.	10	40

D	☉ Rises	☉ Sets	☽ Sets	4 Sets	5 Rise	♀ Rises	♂ Rises	Cl.
1	7h 26	4 35	9 A 36	9 A 13	11 A 18	5 M 56	7 M 32	14
6	7 20	4 41	9 15	8 0	11 6	5 53	Sets	14
11	7 8	4 53	9 0	8 47	10 54	6 48	5 A 20	14
16	6 59	5 2	8 40	8 34	10 42	5 43	6 0	14
21	6 49	5 12	8 25	8 21	10 30	6 38	6 15	14
26	6 30	5 22	8 10	8 7	10 15	6 33	6 34	13

			☽	☉ Dec South
☽ Quarter the 3d	Day at	half past 3 Afternoon.	1	7° 30
Moon the 10th		18 min. past 6 Morn.	8	5 35
Quarter the 17th		15 min. past Noon.	11	3 37
Moon the 25th		38 min. past 3 Aftern.	16	1 39
☉ Enters Aries, 20 Day, 2 h. 49 min. P. M.			21	6 N 19
			26	2 17

M	David, Archb. Menev.	11	A 59	4	A	6
Tu	Cedde or Chad. B. Litc.		Morn.	4		57
W	Ember Week.		1 21	5		53
Th	*Melton Mowbray*, Leicesterſhire.		2 43	6		52
F	*Blandford*, Dorſetſh. *Caerwys*, Flintſh		3 56	7		56
S	*Levenham*, Suffolk. *Walden*, Eſſex.		4 54	9		0
	Reminiſcere. 2 Sund. in Lent.		5 35	10		1
M	*Nottingham*, on old St. Matthias.		6 4	10		58
Tu	Day 11 hours 26 min. long.		6 26	11		53
W	Day breaks 4 h. 24 min.		Rises	Morn.		
Th	Days increaſed 3 h. 49 min.	7	A 37	0		44
F	Greg. M. B. of R. & C.		9 1	1		33
S	Duration of Twilight 1 h. 57 min.	10	25	2		21
	Oculi. 3 Sunday in Lent.	11	45	3		11
M	*Oakham*, Rutlandſh. *Oſweſtry*, Shropſ		Morn.	4		0
Tu	*Penzance*, Cornwall.		1 3	4		51
W	*Malmeſbury*, Wilts. *Hariff*, Huntingd.		2 15	5		43
Th	Ed. K. of Weſt. Sax. *Worksop*, Nott		3 16	6		35
F	*Abbots Promley*, Staff. *Ruthin*, Denb.		4 3	7		28
S	*Durham. Dolton*, Devonſh.		4 41	8		18
	Midlent Sunday		5 6	9		5
M	Equal Day and Night.		5 26	9		51
Tu	*Woburn*, Bedf. *Wrexham*, Denb.		5 43	0		34
W	*Llanerchemith*, Caerm. (*Faſt.*		5 56	11		17
Th	Annun. Lady Day. D. of York born		☽ Sets	11		59
F	*Glouceſter. Nampwich. St. Albans.*	7	A 19	0	A	42
S	*Atherſtone*, Warwickſh. *Preſton*, Lanc		8 36	1		25
	Judica. 5 Sunday in Lent		9 56	2		12
M	*Stourbridge*, Worceſterſhire.		11 19	3		2
Tu	Day 12 hours and 48 min. long.		Morn.	3		55
W	*Durham*, laſts 3 Days		0 40	4		54

D	☉ Rises	☉ Sets	☽ Sets	♄ Sets	♂ Rises	♀ Rises	☿ Sets	Cl. ref. ☉
1	6h 34'	5h 27	8 A 3	7 A 59	10 A 2	6 M 30	7 A 11	12' 44"
6	6 24	5 37	7 52	7 48	9 43	6 23	7 30	11 38
11	6 14	5 47	7 35	7 37	9 24	6 16	7 20	10 21
16	6 4	5 57	7 24	7 26	9 5	6 9	7 10	8 55
21	5 54	6 7	7 12	7 15	8 46	0	Rises	7 24
26	5 44	6 17	6 48	7 0	8 20	5 52	5 20	5 55

APRIL hath xxx. Days

| | | |

MAY hath xxxi Days.

| | | |

JUNE hath xxx Days.

Full Moon the 6th
Last Quarter the 14th
New Moon the 22d
First Quarter the 28th
Day at { 12 min. past 4 Aftern. / 3 min. past 6 Aftern. / 16 min. past 1 Morn. / 46 min. past 3 Aftern.

⊙ Enters Cancer, 21 Day, 1 h. 45 min. P. M.

M D	⊙ Decl. North
1	22° 6
6	22 42
14	23 18
16	23 24
22	23 29
26	23 24

1	Tu	Whit-Tuesday *Newark*, on Trent.	1 M 45	8 A 10	
2	W	Ember Week. *Lenton*, Nott.	1 57	8 56	
3	Th	*Harsley Green*, Lanc. *Kirkby St.* West.	2 12	9 43	
4	F	King GEORGE III. born, 1738.	2 26	10 32	
5	S	Boniface Bp. of Mentz. M.	2 45	11 22	
6	C	Trinity Sunday.	☽ Rises	Morn.	
7	M	On the Morrow of the Holy Trinity	9A. 50	0 16	
8	Tu	*St. Germains*, Cornwall.	10 40	1 11	
9	W	*Hadderfield*, Suſſex.	11 19	2 3	
10	Th	Princeſs AMELIA born C.C. Day.	11 47	2 54	
11	F	St. Barnabas, A. M. Term begin	Morn.	3 42	
12	S	*Bartlow*, Eſſex. *Hadlow*, Kent.	0 8	4 26	
13	C	1 Sunday after Trinity.	0 24	5 9	
14	M	In 8 Days of the Holy Trinity.	0 37	5 51	
15	Tu	*Reyſton*, Somerſetſhire.	0 47	6 30	
16	W	*Wrexham*, Denb.	0 58	7 12	
17	Th	St. Alban, Mart.	1 10	7 54	
18	F	*Wellington*, Shropſh. *Wiggan*, Lanc.	1 22	8 39	
19	S	*Ingleton*, Yorkſhire.	1 40	9 25	
20	C	2 Sunday after Trinity.	2 2	10 23	
21	M	From the D. of Ho. Tr in 15 Days.	2 36	11 24	
22	Tu	*Boroughbridge*, Yorkſh. *Leek*, Staff.	☽ Sets	0A 29	
23	W	*Armington*, Devonſhire. (*Faſt.*)	10A 21	1 34	
24	Th	St. John Bapt. Midſummer Day	10 53	2 36	
25	F	Days will ſoon be decreaſing.	11 16	3 34	
26	S	*Chapel-Silves*, Kent. *Penſhurſt*, Worc.	11 33	4 28	
27	C	3 Sunday after Trinity.	11 47	5 17	
28	M	From the D. of H. T. in 3 Weeks. *Faſt*	12 0	6 4	
29	Tu	St. Peter and St. Paul, Aps. & M.	Morn.	6 50	
30	W	Term Ends. *Bridgenorth*, Shropſh.	0 13	7 36	

M D	⊙ Riſes	⊙ Sets	♄ Riſes	♅ Riſes	♂ Sets	♀ Sets	☿ Sets	Equat. ⊙
1	3h 53	8h 7	2 M 10	2 M 19	1 M 55	9 A 37	8 A 56	2 43
6	3 49	8 11	1 49	1 52	1 25	9 47	9 14	1 54
11	3 46	8 14	1 30	1 35	1 7	9 51	9 54	0 57
16	3 44	8 16	1 19	1 18	0 44	9 52	☽ 59	bef. ⊙
21	3 43	8 17	0 50	1 1	0 30	9 51	☽ 54	0 17
26	3 44	8 16	0 30	0 44	0 10	9 [illegible]	☽ 42	1 2

JULY hath xxxi Days

Full Moon the 6th
Last Quarter the 14th
New Moon the 21st
First Quarter the 27th

Day of: half past 5 Morn. | 6 min. past 9 Morn. | 26 min. past 8 Morn. | 21 min. past 11 Night.

1	Th	*Hitch*, Kent. *Worksop*, Nottinghamsh.	0 M	28	8	A	24	
2	F	Visit. of the B. V. Mary.	0	44	9		13	
3	S	*Dereham*, Norf. *Shrewsbury.*	1	7	10		5	
4	C	4 Sunday after Trinity.	1	38	10		55	
5	M	Old Midsummer Day.	2	18	11		50	
6	Tu	*Bungey*, Suff. *Lancaster. Liverpool.*	☽ Rises		Morn.			
7	W	Tho. a Becket. *Chipping Norton*, Ox.	9 A	44	0		42	
8	Th	*Folestone*, Kent. *Machynleth*, Montg.	10	8	1		31	
9	F	*Bromley*, Devonsh.	10	24	2		17	
10	S	*Howden*, York. *Wolverhampton*, Staff.	10	37	3		0	
11	C	5 Sunday after Trinity.	10	49	3		41	
12	M	*Canterbury*, K. *Peterborough*, North.	10	59	4		21	
13	Tu	*Huntingdon. Woburn*, Bedf.	11	10	5		2	
14	W	Days decreased 26 min.	11	23	5		43	
15	Th	Swithin, B. of Winchester translated.	11	37	6		20	
16	F	*Winchest.* Hampsh. *Woodhurst*, Dorset.	11	55	7		12	
17	S	*Leek*, Staff. *Stevenage*, Hertf.	Morn.		8		4	
18	C	6 Sunday after Trinity.	0	23	9		1	
19	M	*Kinningball*, Norfolk.	1	4	10		3	
20	Tu	Marg. V. & M. Antioch.	2	3	11		8	
21	W	*Alberwin-Green*, Hamp. *Foulness*; K.	☽ Sets		0 A		13	
22	Th	Princess Caroline Matilda bo. 1751	9 A	15	1		14	
23	F	*Daventry*, North. *Earl-Soham*, Suff.	9	34	2		12	
24	S	*Faringhay*, Kent. (*Fast.*	9	50	3		6	
25	C	7 S. after Trin. St. James Ap. & M.	10	4	3		55	
26	M	St. Anne, Mother of Bl. Virg. Mary.	10	17	4		43	
27	Tu	*Headon*, Yorksh. *Portsdown*, Hants.	10	31	5		29	
28	W	*Emlin*, Worc. *Fairford*, Glouces.	10	48	6		19	
29	Th	Day 15 hours and half long.	11	7	7		7	
30	F	*Caerlton*, Monm. *Linton*, Camb.	11	36	7		58	
31	S	*Honiton*, Devonsh.	Morn.		8		50	

D	☉ Rises	☉ Sets	☽ Rises	♃ Rises	♂ Sets	♀ Sets	☿ Sets	Cl. bed
1	3h 46'	8	14	0 M 11	0 M 27	11 A 54	9 A 45	9 A 36	3' 13"
6	3 49	8	11	11 45	0 1	11 37	9 58	9 10	4 7
11	3 53	8	7	11 20	11 A 45	11 21	9 31	8 44	4 52
16	3 58	8	2	10 56	11 19	11 0	9 24	8 18	5 28
21	4 4	7	56	10 30	11 0	10 50	9 17	7 52	5 49
26	4 11	7	49	10 2	10 50	10 41	9 10	7 26	5 57

AUGUST hath xxxi Days.

M D	☉ Decl. North.	
1	18°	5
6	16	43
11	15	17
16	13	45
21	12	7
26	10	25

Full Moon the 4th
Last Quarter the 12th
New Moon the 19th
First Quarter the 26th
} Day at {
6 min. past 8 at Night.
55 min. past 9 at Night.
28 min. past 3 Aftern.
3 min. past 10 Morn.

1	C	8 Sun. aft. Trin Lammas Day.	☌M	13	9 A 44
2	M	*Northwich*, Chesh. *Winchester*.	1	3	10 35
3	Tu	*Auburn*, Wilts. *Daventry*, Northamp.	2	4	11 26
4	W	*Epsom*, Surry. *Thursk*, Yorksh.	☽ Rises		Morn.
5	Th	*Boston*, Linc. *Doncaster*, Yorksh.	8A	29	0 13
6	F	Transfig. of our Lord.	8	44	0 57
7	S	Name of Jesus.	8	56	1 40
8	C	9 Sunday after Trinity.	9	6	2 20
9	M	*Ruthin*, Denb. *Shirkin*, Middl.	9	18	3 0
10	Tu	S. Laur. Arch D. of R. & M.	9	29	3 40
11	W	*Aberfraw*, Angl. *Allchurch*, Heref.	9	42	4 22
12	Th	Old Lammas-Day. *Newcastle*.	9	59	5 7
13	F	*Northampton*. *St. Eades*, Hertf.	10	21	5 55
14	S	*Stow*, Suffolk.	10	54	6 48
15	C	10 Sunday after Trinity.	11	44	7 46
16	M	*Donnington*, Linc. *Gisbro'*, Yorksh.	Morn		8 50
17	Tu	*Bardney*, Hampshire.	0	54	9 54
18	W	Day 14 h. 24 min. long.	2	20	10 58
19	Th	*Dartington*, Devonshire.	☽ Sets		11 58
20	F	☉ Amplitude N. 16°. 35'.	7A	56	0A 54
21	S	*Horncastle*, Linc.	8	12	1 47
22	C	11 Sunday after Trinity.	8	25	2 38
23	M	*Letford*, Northumb.	8	40	3 27
24	Tu	St. Bartholomew, Ap. & M.	8	56	4 17
25	W	*Llanerchemith*, Angl. *Milver*. Som.	9	15	5 7
26	Th	*Carlisle*. *Huntingdon*. *Worcester*.	9	41	5 58
27	F	*Coventry*, Warw. *Lambeth*, Surry.	10	16	6 51
28	S	St. Aug. B. of Hip. C. D.	11	3	7 46
29	C	12 Sunday after Trinity.	Morn		8 38
30	M	Days decreased 2 h. 56 min.	0	1	9 29
31	Tu	Day 12 h. 24 min. long.	1	9	10 18

M D	☉ Rises	☉ Sets	♄ Rises	♅ Rises	♂ Sets	♀ Sets	☿ Rises	Eq. bef. ☉
1	4h 20	7 40	10 A 5	10A 27	10A 14	8 A 55	4 M 6	5 49″
6	4 27	7 33	9 4	10 7	10 0	8 45	3 25	5 23
11	4 35	7 24	9 25	9 47	9 48	8 35	3 3	4 44
16	4 44	7 15	9 5	9 27	9 34	8 30	3 5	3 52
21	4 53	7 6	8 45	9 7	9 22	8 25	3 3	2 44
26	5 2	6 57	8 25	8 47	9 8	8 5	3 3	1 27

SEPTEMBER hath xxx Days.

M. D.	☉ Decl. North.
1	8° 16
6	6 36
11	4 38
16	2 36
22	0 20
26	1 S 18

Full Moon the 3d, Last Quarter the 11th, New Moon the 17th, First Quarter the 24th } Day at { 56 min. past 11 Foren. / 42 min. past 8 Morn. / half past 11 at Night. / 27 min. past Midnight.

☉ enters Libra, 22 Day, 15 h. 19 min. P. M.

1	W	Giles Abbot & Conf.	2 20	11 A	3
2	Th	London Burnt, in 1666. O. S.	3 33	11	4
3	F	*Brecknock*, 6 Days. *Bridgefoot*, Dev.	☽ Rises	Morn.	
4	S	*Bartholomew*, London. *Monmouth.*	7 A 22	0	27
5	C	13 Sunday after Trinity.	7 34	1	7
6	M	*Falkingham*, Linc.	7 44	1	48
7	Tu	Dog Days End.	7 56	2	29
8	W	Nativ. of the Bl. Virg. Mary.	8 13	3	12
9	Th	*Atherstone*, Warw. *Stourbridge*, Worc.	8 32	3	59
10	F	Day 12 hours 56 m. long.	9 0	4	48
11	S	*Tallowdown*, Dorsetsh.	9 40	5	44
12	C	14 Sunday after Trinity.	10 39	6	43
13	M	*Newton*, Lanc.	11 57	7	45
14	Tu	Holy Cross Day.	Morn.	8	48
15	W	Ember Week.	1 27	9	48
16	Th	*Lutterworth*, Leic. *Newcastle*, Staff.	3 0	10	46
17	F	Lambert, Bish. & M.	☽ Sets	11	4
18	S	*Masham*, Yor. *Southw. Stirbitch*, Cam.	6 A 38	0 A	32
19	C	15 Sunday after Trinity.	6 53	1	23
20	M	*Devizes*. *Manchester*, Lanc. (*Fast*	7 7	2	14
21	Tu	St. Matthew, Ap. & E.	7 26	3	5
22	W	K. George III. Crowned, 1761.	7 50	3	55
23	Th	*Halkin*, Wilts. *Painscastle*, Radnor.	8 21	4	53
24	F	*Chesthunt*, Hertf.	9 4	5	4
25	S	*Chesterfield*, Derb.	10 0	0	42
26	C	16 Sunday after Trinity.	11 5	7	32
27	M	*Clapham*, Yorksh. *Northall*, Middl.	Morn.	8	25
28	Tu	*Gloucester*. *Tuxford*, Nott.	0 17	9	5
29	W	St. Michael, and all Angels.	1 31	9	52
30	Th	St. Jer. Pr. Conf. & Doct.	2 42	10	35

M. D.	☉ Rises	☉ Sets	☽ Rises	♅ Rises	♃ Sets	♀ Sets	♂ Rises	Clar. ☉
1	5h 14'	6 4	8 A 9	8 A 36	8 A 59	7 A 52	4 M 18	0' 19'
6	5 25	6 36	7 50	8 18	8 51	7 44	Sets	1 58
11	5 33	6 26	7 31	7 59	8 43	7 36	6 A 38	3 39
16	5 43	6 16	7 12	7 41	8 35	7 28	6 32	5 22
21	5 53	6 6	6 53	7 22	8 27	7 20	6 26	7 6
26	6 2	5 56	6 32	7 4	8 19	7 12	6 20	8 47

OCTOBER hath xxxi Days.

			M D	☉ Decl. South
Full Moon	the 3d	28 min. past 4 Morn.	1	3° 25
Last Quarter	the 10th	35 min. past 5 Aftern.	6	5 11
New Moon	the 17th	14 min. past 9 Morn.	13	7 6
First Quarter	the 24th	20 min. past 6 at Night.	16	8 58
			21	10 47
			26	13 32

1	F	Remig. B. of Rhemes.	3	M	5 4	11 A 14
2	S	*Nottingham, Goose Fair*; lasts 8 Days.	5		5 11	56
3	C	17 Sunday after Trinity.	☽	Rises		Morn.
4	M	*Penkridge*, Staff.	6	A	1 4	0 37
5	Tu	*Llanvilling*, Montg. *Lamport*, Som.	6		2 7	1 20
6	W	Faith, V & M. *Hull*, Yorksh.	6		4 5	2 6
7	Th	*Billericay*, Essex. *Counteis-Court*, Wilt.	7		1 1	2 56
8	F	*Abingdon*, Berks. *Challock*, K. *Swansey*.	7		4 6	3 50
9	S	St. Denys, Areop. B. & M.	8		3 8	4 46
10	C	18 S. aft. Trin. Old Michaelmas D.	9		4 7	5 46
11	M	*Lancaster*. *Leicester*.	11		1 2	6 47
12	Tu	*Banbury*, Oxf *Devizes*, Wilts.	Morn.			7 44
13	W	Translat. of K. Ed. Conf.	0		4 2	8 41
14	Th	*Buttonmoor*, Shropsh. *Worksop*, Nott	2		1 2	9 34
15	F	*Falsley*, Warwicksh.	3		4 1	10 27
16	S	☉ Ecl. Vis. 6 h. 52 m. Sunday Morn.	5		1 1	11 16
17	C	19 Sunday after Trinity.	☽	Sets		0 A 7
18	M	St. Luke Ev. *Radnor*. *Cank*, Staff	5	A	3 5	0 59
19	Tu	*Market-Harbor*. Leic. *Oxford*.	5		5 7	1 51
20	W	*Alhborne*, Derb. *Heref*. *Heanor*, Derb.	6		2 5	2 46
21	Th	*Gainsbro'*, Linc. *Banbury*, Oxf.	7		3	3 42
22	F	*Rudgeley*, Staff. *Wells*, Som.	7		5 4	4 38
23	S	*Ripley*, Derb. *Saff*. *Walden*, Esf.	8		5 7	5 31
24	C	20 Sunday after Trinity.	10		8	6 24
25	M	King GEORGE III. Inaug. 1760	11		1 9	7 18
26	Tu	King GEORGE III. Proclaimed.	Morn.			7 56
27	W	*Appletreewick*, Yorksh. (*Fast*	0		3 3	8 37
28	Th	St. Sim. & Jude, Aps. & Ms.	1		4 5	9 18
29	F	*Askrigg*, York. *Burton*, upon Trent.	2		5	9 58
30	S	*Banbury*, Ox. *Ely*, Camb.	4		6	10 38
31	C	21 Sunday after Trinity.	5		1 0	11 2

M	D	☉ Rises	☉ Sets	☽ Rises	♃ Rises	♄ Sets	♀ Sets	☿ Sets	Cl. aft ☉
10	1	6h 12	5h 47	6 A 39	6 A 40	8 A 12	7 A 0	6 A 12	10 26
8	6	6 22	5 37	5 56	6 11	8 7	6 57	6 4	11 55
11	6	6 32	5 27	Sets	5 51	8 2	6 48	5 56	13 14
26	5	6 42	5 18	6 A 15	5 31	7 57	6 44	5 58	14 24
11	6	6 51	5 8	5 57	5 11	7 52	6 44	5 46	15 39
26	5	7 14	4 58	5 39	5 0	7 47	6 42	5 32	15 54

NOVEMBER hath XXX Days.

D.	☉ South.
1	14° 31′
6	16 5
11	17 38
16	18 30
21	20 0
26	21 2

Full Moon the 1st
Last Quarter the 9th
New Moon the 15h
First Quarter the 23d
} Day at {
3 quart. past 8 at Night.
1 quarter past 1 Morn.
27 min. past 9 at Night.
48 min. past 2 Aftern.

		All Saints Day. ☽ Eclipsed Visible.	Aftern.	Morn.
1	M		4 56	0 7
2	Tu	All Souls *Leek*, Staff *Loughbor.* Leic	5 18	0 55
3	W	On the Morrow of all Souls.	5 51	1 47
4	Th	*Appleſtaw*, Hants.	6 37	2 44
5	F	Papills Conſpiracy, 1605.	7 41	3 44
6	S	Leonard, Conf. Term Begins.	9 0	4 44
	C	22 Sunday after Trinity.	10 27	5 43
8	M	*Aſhby-de-la-Zouch*, Leiceſt.	11 56	6 39
9	Tu	*Darlington*, Durham. *Stamford*, Linc.	Morn.	7 31
10	W	*Rocheſter*, Kent. *Ruthin*, Denb.	1 22	8 21
11	Th	St. Martin, Bp. & Conf.	2 48	9 9
12	F	On the Morrow of St. Martin.	4 14	9 58
13	S	Britius, Bp.	5 40	10 47
14	C	23 Sunday after Trinity.	☽ Sets	11 38
15	M	Machutus, Bp.	4A 22	0A 32
16	Tu	*Launceſton*, Cornw. *Sheffield*, Yorkſh.	4 55	1 27
17	W	Hugh, Bp of Linc.	5 39	2 24
18	Th	In eight Days of Saint Martin.	6 38	3 19
19	F	*Woodcott*, Oxf. *Yarme*, Yorkſh.	7 47	4 12
20	S	Edmund, K. & M.	9 9	5 1
21	C	24 Sunday after Trinity.	10 13	5 47
22	M	Cecilia, Virg. & Mart.	11 25	6 29
23	Tu	St. Clem. I. Bp. of R. & M.	Morn.	7 10
24	W	Days are now decreaſed 8 ho. 12 m.	0 35	7 50
25	Th	Pr. WILLIAM HENRY born, 1734.	1 46	8 29
26	F	*Caſtletown*, Monm.	2 56	9 11
27	S	*Littlebury*, Eſſex.	4 9	9 54
28		Advent Sunday.	5 26	10 40
29	M	Term Ends.	6 47	11 32
30	Tu	St. And. A. & M. Pſs. Dow. W. b 1714		

M. D	☉ Riſes	☉ Sets	♄ Sets	♃ Sets	♂ Sets	♀ Sets	☿ Sets	Clock. ☉
1	7h 12	4h 47	5 M 23	6 M 57	7 A 53	5 A 41	5 A 22	16 11 14
6	7 22	4 37	4 59	6 33	7 50	5 43	Riſes	16 0 8
11	7 29	4 30	4 37	5 59	7 50	5 45	7 M 0	15 11 43
16	7 37	4 22	4 15	5 25	7 55	5 47	6 20	14 0 54
21	7 4	4 15	3 53	4 17	7 59	5 49	6 1 5	13 11 45
26	7 51	4 9	3 32	4 49	8 5	5 51	5 44	13 0 18

DECEMBER hath xxxi Day

M D	☉ Decl. South.
1	21° 53
6	22 34
11	23 4
16	23 22
21	23 29
26	23 24

Full Moon the 1st
Last Quarter the 8th
New Moon the 15th
First Quarter the 23d
Full Moon the 30th
} Day at {
36 min. past 11 Forenoon.
3 quarters past 8 Morn.
37 min. past 11 Forenoon,
24 min. past Noon.
half past Midnight.

☉ Enters Capricorn, 21 Day, 6 h. 57 min. P. M. AT.

			Aftern.	Morn.
1	W	*Rotherham*, Yorksh. (Abr. Morstall.)		
2	Th	*Hoxne*, Suffolk.	4 A 24	0 27
3	F	*Darlington*, Durham. (Luke Elstob.)	5 23	1 27
4	S	*Atherstone*, Warw. *Bangor.*	6 39	2 30
5	C	2 Sunday in Advent.	8 0	3 30
6	M	Nichol. Bish. of Myra in Lycia.	9 34	4 27
7	Tu	Day 7 hours 56 min. long.	11 0	5 20
8	W	Concept. of the B. V. M.	Morn.	6 10
9	Th	*Bradford*, Wilts.	0 25	6 58
10	F	*Kimbolton*, Hunt. *Newport*, Shrop.	1 48	7 44
11	S	*Beverley*, Worc. *Preston*, Lanc.	3 10	8 32
12	C	3 Sunday in Advent.	4 34	9 21
13	M	Lucy, Virg. & Mart.	5 59	10 11
14	Tu	Days decreased 8 ho. 3 quarters.	7 22	11 5
15	W	Ember Week.	☽ Sets	0 A 0
16	Th	O Sapientia.	4 A 14	0 56
17	F	*Exeter*, Devonsh. *Grantham*, Linc.	5 19	1 50
18	S	*Spalding*, Linc.	6 30	2 42
19	C	4 Sunday in Advent.	7 44	3 29
20	M	*Bedford. Northampton.* (Fast	8 57	4 13
21	Tu	St. Thomas Ap. & M. Shortest Day.	10 8	4 54
22	W	*Newport-Kearns*, Montgom.	11 16	5 33
23	Th	Day breaks 1 min. past 6.	Morn.	6 11
24	F	Durat. of Twil. 2 h. 11 m. (Fast	0 25	6 51
25	S	CHRISTMAS-DAY.	1 36	7 34
26	C	1 Sun. af. Chr. St. Stephen, 1st Mart.	2 50	8 17
27	M	St. John, Ap. & Ev.	4 7	9 6
28	Tu	Innocents Day.	5 28	9 59
29	W	*Cockhill*, Som.	6 49	10 58
30	Th	*Maiden-Bradley*, Wilts.	☽ Rises	11 59
31	F	Silvest. B. of Rome.	4 A 4	Morn.

M D	☉ Rises	☉ Sets	♄ Sets	♃ Sets	♂ Sets	♀ Sets	☿ Rises	Chaft. ☉
1	7h 57	4h 3	3 M 8	4 M 33	7 A 51	6 A 51	5 M 54	10′ 32′
6	8 1	3 59	2 47	4 11	7 51	6 41	6 9	8 28
11	8 5	3 55	2 25	3 49	7 52	6 36	6 24	6 14
16	8 7	3 53	2 4	3 27	7 52	6 27	6 39	3 59
21	8 9	3 51	1 43	3 5	7 53	6 18	6 54	1 20
26	8 7	3 53	1 20	2 43	7 54	6 8	7 9	1 bef. 11

A TABLE of all the KINGS and QUEENS of *England*, since the Conquest.

The Year of the Birth of each King and Queen; also the Year, Month, and Day, whereon they began to reign: beginning the Year the first Day of January. 1762.			The Length of each Reign.			The Years expired since each Reign ended.
Names.	Born.	Began to Reign.	Y.	M.	D.	End
William Conq	1027	1066 October 14	20	10	26	675
William Rufus	1057	1087 Septem. 9	12	10	24	662
Henry I.	1068	1100 August 2	35	4	0	637
Stephen	1105	1135 Decem. 1	18	10	24	608
Henry II.	1132	1154 October 25	34	8	4	573
Richard I.	1156	1189 July 6	9	9	8	563
John	1166	1199 April 6	17	6	13	546
Henry III.	1207	1216 October 19	56	1	0	490
Edward I.	1239	1272 Novem. 16	34	7	21	455
Edward II.	1284	1307 July 7	19	6	13	435
Edward III.	1312	1327 January 20	50	5	1	385
Richard II.	1366	1377 June 21	22	3	8	363
Henry IV.	1367	1399 Septem. 29	13	5	21	349
Henry V.	1389	1413 March 20	9	5	1	340
Henry VI.	1421	1422 August 31	38	6	4	301
Edward IV.	1442	1461 March 4	22	1	5	279
Edward V.	1471	1483 April 9	0	2	13	279
Richard III.	1443	1483 June 22	2	2	0	277
Henry VII.	1457	1485 August 22	23	8	0	253
Henry VIII.	1492	1509 April 22	37	9	6	215
Edward VI.	1537	1547 January 28	6	5	8	209
Mary I.	1516	1553 July 6	5	4	11	204
Elizabeth	1533	1558 Novem. 17	44	4	7	159
James I.	1566	1603 March 24	22	0	3	137
Charles I.	1600	1625 March 27	23	10	3	113
Charles II.	1630	1649 January 30	36	0	7	77
James II.	1633	1685 February 6	4	0	7	73
William III.	1650	1689 Feb. 13	5	10	15	60
Mary II.	1662		13	0	23	68
Anne	1665	1702 March 8	12	4	24	48
George I.	1660	1714 August 1	12	10	10	35
George II.	1683	1727 June 11	33	4	3	2
George III.	1738	1760 October 25	whom God preserve			

A Compendious TABLE of INTEREST,

Shewing the Interest of any Sum of Money, from a Million to a Pound; for any Number of Days, at any Rate of Interest.

No.	l.	s.	d.	q.	
1000000	2739	14	6	0	,99
900000	2465	15	0	3	,29
800000	2191	15	7	1	,59
700000	1917	16	1	3	,89
600000	1643	16	8	2	,19
500000	1369	17	3	0	,49
400000	1095	17	9	2	,79
300000	821	18	4	1	,09
200000	547	18	10	3	,40
100000	273	19	5	1	,70
90000	246	11	6	0	,32
80000	219	3	6	0	,96
70000	191	15	7	1	,59
60000	164	7	8	0	,22
50000	136	19	8	2	,85
40000	109	11	9	1	,48
30000	84	3	10	0	,11
20000	54	15	10	2	,74
10000	27	7	11	1	,37
9000	24	13	1	3	,23
8000	21	18	4	1	,10
7000	19	3	6	2	,96
6000	16	8	9	0	,82
5000	13	13	11	2	,58
4000	10	19	2	0	,55
3000	8	4	4	2	,41
2000	5	9	7	0	,27
1000	2	14	9	2	,14

No.	l.	s.	d.	q	,
1000	2	14	9	2	,14
900	2	9	3	3	,12
800	2	3	10	0	,11
700	1	18	4	1	,10
600	1	12	10	2	,80
500	1	7	5	3	,70
400	1	1	11	0	,50
300	0	16	5	1	40
200	0	10	11	2	,30
100	0	5	5	3	,01
90	0	4	11	0	,71
80	0	4	4	2	,41
70	0	3	10	0	,11
60	0	3	3	1	,81
50	0	2	8	3	,51
40	0	2	2	1	,21
30	0	1	7	0	,90
20	0	1	1	0	,60
10	0	0	6	2	,30
9	0	0	5	3	,67
8	0	0	5	1	,04
7	0	0	4	2	,41
6	0	0	3	3	,78
5	0	0	3	1	,15
4	0	0	2	2	,52
3	0	0	1	3	,89
2	0	0	1	1	,26
1	0	0	0	2	,63

RULE.

Multiply the Sum by the Number of Days; and that Product by the Rate per Cent. Then cut off the two last Figures to the Right Hand, and the rest you must find in the Table.

Example, What is the Interest of 100 l. for 365 Days at 5 per Cent.

No. of Days	365	Then in the Table				
multiply by	100	againſt	1000	is 2	14	9 2 ,14
Product	36500		800	2	3	10 0 ,11
multiply by	5 Rate p. Cent.		20	0	1	1 0 ,60
	182500		5	0	0	3 1 ,15
		Anſw.	5	0	0	0 0 .00

Calculations of all the Eclipses of the Luminaries, which will happen in the Year 1762.

By Mr. *John Metcalfe*.

There will happen four Eclipses in this Year 1762; two of the Sun, and two of the Moon: in the following Order.

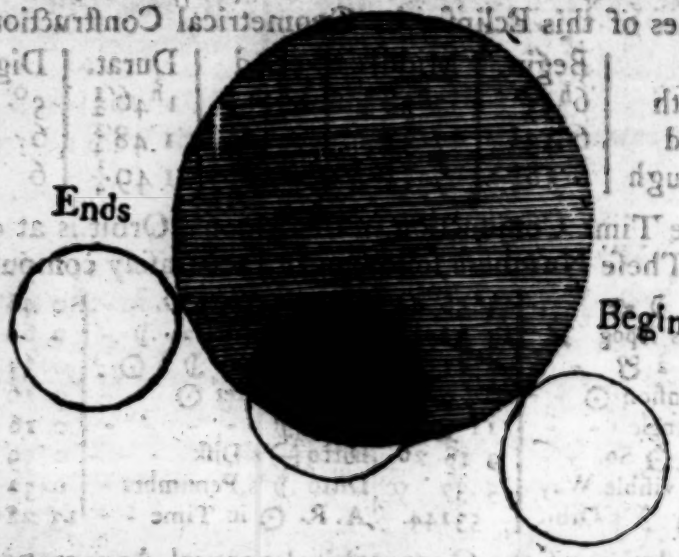
The first is of the Sun, on *Saturday* the 24th Day of *April*, 16 min. after 6 o' Clock in the Morning, Apparent Time, Invisible in *Europe*, *Africa*, *America*, and most Parts of *Asia*; but the Sun may be seen *partially* eclipsed on its Southern Limb from the Promontory of *Molocca*, in the *East Indies*; the Islands of *Sumatra*, *Java*, *Borneo*, *Celebes*, *Mindanao*, the *Philippines*, and the *Moluccas*: It will be *Annular* in the *Southern* and *Indian* Oceans; in *New-Holland* and *Carpentaria*, where the Sun will go down *centrally* eclipsed; as may be gathered from the subjoined Table of the Geographical general *Phænomena*, computed from *Brent's Compendious Astronomer*:

24 *Apr.* 1762. in the Morn	Ap. Time at *London*	Latitude South.	Longitude East.
The Eclipse begins at Sun Rise - -	4h 11 13	51° 50′ 23″	44° 5′ 24
The Sun rises centrally eclipsed - -	5 28 39	68 45 21	23 47 17
Centrally eclipsed in the Meridian - -	6 4 55	41 49 42	88 46 15
D°. in the 90th Degree of the Ecliptic	6 35 59	31 57 29	98 12 30
D°. at the Middle of Penumbra's Transit	6 44 7	29 51 22	100 24 11
D°. under the Solstitial Colure - -	7 38 32	22 7 35	123 39 31
D°. at the neareſt App. of Penum. to N.P.	7 50 48	19 5 53	127 15 44
The Sun ſets centrally eclipsed - - -	7 59 35	21 23 57	144 58 13
The Eclipse ends at Sun-ſet - - -	9 17 1	2 43 23	130 7 24

To the Time of the Orbit Conjunction the following Numbers are computed (Orbit Conj. Ap. 24 D. 5 H. 38′. 9″. A. M. Mean Time)

Longitude ☉ ☽ - - - ♉ 3°	57′ 56″	Meridian Angle	70° 11′ 3″
Latitude ☽ S. D. - - - -	41 53½	Diſt. ☽ ☉ ☊ ☍	7 36 14
Horizontal Parallax ☽ - -	57 4	Right Aſcen. ☉	31 42 29
Hourly Motion ☽ à ☉ - -	30 34	Declination ☉	12 51 48
Semidiameter ☉ - - - -	15 17	Ang. ☽'s vis Way	5 40
Ditto ☽ —— ——	15 38	Semid. ☊'s Diſk	0 56 52
Eccentricity ☽'s Orbit - -	439 44	D°. ☽'s Penumbra	0 31 35

The ſecond is a partial Eclipſe of the Moon, on *Saturday* the eighth Day of *May*, in the Morning; the Moon will ſet Eclipſed, but (if it be a clear Morning) the greater Part of it will be Viſible, agreeable to the following Calculation, and Type.



Ap. Time at	London	York	Wentwor.	Richmond	Eccent. 4344
Eclipse beg.	2h 24′ 40″	2h 20′ 40″	2h 19′ 10″	2h 17′ 52″	L. ☽ S.A. 32 30
Cent. Imm.	3 5 15	3 1 15	2 59 45	2 58 27	H. P. ☽ 57 21
Mid. of Ecl	3 58 19	3 54 19	3 52 49	3 51 31	HM ☽ à ☉ 30 56
Ecliptic ☌	4 4 33	4 0 33	3 59 3	3 57 45	Semid. ☽ 1543
Cent. Emer.	4 51 23	4 47 23	4 45 53	3 44 35	Dur. Ecl. 3h 7 11
Eclip. ends	5 31 58	5 27 58	5 26 28	5 25 10	Dig. ec. 9° 48 40

At the Beginning of this Lunar Eclipse, the Moon will be vertical to the *Brazilian Sea*, at the Middle to *Pataguay*, and at the End to the *Peruvian Sea*; consequently, it will be Visible, from the Beginning to the End, to all *South America*, and the most known Parts of *North America*, *Portugal*, and the West Parts of *Spain*; the *Atlantic* and *Pacific* Oceans; the West Coast of *Barbary*, *Negroland*, *Guinea*, and the *Cape of Good Hope*; but, from the *Red Sea*, *Egypt*, the *Levant*, lesser *Asia*, *Euxine* or *Black Sea*, West Frontiers of *Muscovy*, Gulph of *Finland*, and all the *European* and *African* Nations and Kingdoms Westward, only Part of the Eclipse can be seen; because, in those Countries, the Moon will set, before the Eclipse ends.

The third Eclipse is a visible one of the Sun, on *Sunday* the 17th Day of *October*, in the Morning, correspondent to the following Computation.

The true *Type*, at the Beginning, Middle, and End, for London.

17 *October*, App. Time at	*London.* H. m. s.
Beginning	6 52 5
Greatest Obscuration	7 42 15
Middle	7 43 56½
End	8 35 48
Time of Incidence	0 50 10
Time of Repletion	0 53 33
Duration	1 43 43
Digits Eclipsed	4° 56 23
Angle, Line greatest Obsc. with ☉'s vis. Diam.	61 34 36

e Times of this Eclipse, by Geometrical Construction.

r the	Begin.	Middle	End	Durat.	Dig. Ec
ntworth	$6^h 45'$	$7^h 38' \frac{3}{4}$	$8^h 31' \frac{1}{2}$	$1^h 46' \frac{1}{2}$	$5° \frac{3}{4}$
hmond	$6\ 43\frac{1}{4}$	$7\ 38$	$8\ 32\frac{3}{4}$	$1\ 48\frac{3}{4}$	$6\ \frac{1}{6}$
nborough	$6\ 38\frac{1}{2}$	$7\ 33\ \frac{1}{2}$	$8\ 28\frac{1}{2}$	$1\ 49\frac{3}{4}$	$6\ \frac{1}{2}$

he true Time Conjunction in the Moon's Orbit is at 9 h. 17". These Numbers following are accurately computed:

git. ☉ ☽ ♎ -	23° 56′ 44″	Latitude ☽ N. ☽. - -	0 46′ 56″
git. ☽'s Apog. ♓	13 31 1	Horizontal Paral. ☽ -	0 60 0
. ☉ ☽ à ☌ - -	8 31 41	Hourly Mot. ☽ à ☉ -	0 33 55
ht Ascension ☉ - -	202 9 41	Semidiameter ☉ - -	0 16 10
idian Angle - -	111 39 13	Ditto ☽ - - - - -	0 16 26
lination ☉ So. - -	9 18 26	Ditto ♁'s Disk - - -	0 59 48
gle ☽'s visible Way	5 37 0	Ditto ☽'s Penumbra -	0 32 36
entricity ☽'s Orbit	53144	A. R. ☉ in Time - -	13 28 39

A Calculation of the Geographical general Appearance.

	Ap. Time at *London*	Latitude North.	Longitude East.
nidiameter of the total Shade 16″			
ration of total Darkness 56″ - - -	$6^h\ 50'\ 32$	$56° 37'\ 19$	$1° 46'\ 21$
Eclipse begins as the ☉ rises - -	8 5 47	75 36 42	8 15 33
☉ rises totally and centrally eclips'd	8 28 32	52 41 56	52 52 0
ally and centrally eclipsed in Merid.	9 3 14	38 35 57	66 3 17
tral and total in the 90th Degree	10 16 53	24 5 24	113 34 37
☉ sets totally and centrally eclips'd	11 32 8	9 12 38	96 26 24
Eclipse ends, as the Sun sets - -	4 41 36	53 24 41	94 40 13
rat. & relative Diff. of Lat. & Long.			

From the foregoing general Table, we learn, that the Center of the Lu- Shade comes upon the Globe in the *Hyperborean Ocean*, near the South t Coast of *Greenland*; and, after traversing the North frozen Ocean, South Easterly Direction, it passes by the *North Cape*, crosses *Moscovia*, land, the *White Sea*, *Russia*, the great River *Wolga*, into *Siberia*, out Noon) travelling with great Velocity; and, leaving the *Caspian* or rtanian Sea to the West, its outh Easterly Course is continued over the rth East Parts of *Persia*, the River *Indus*, *Mogul India*, both on this Side beyond the River *Ganges*, and into the most South Western Province *China*, where it rises from the *Earth*, and enters the *Expansum*.

The Duration of this Eclipse, to all the Inhabitants under the Central h, will be 1 h. 55 m. 20 sec. and the Time that they will be involved total Darkness 56 Seconds: These People may, probably, be struck with great a *Panic* at the Sight of this unusual Phænomenon, as the *British* abitants have been formerly at the like natural Appearance; for it will so dark in those Countries, that the Stars, both of the first and second agnitude, then in the Hemisphere, will be visible.

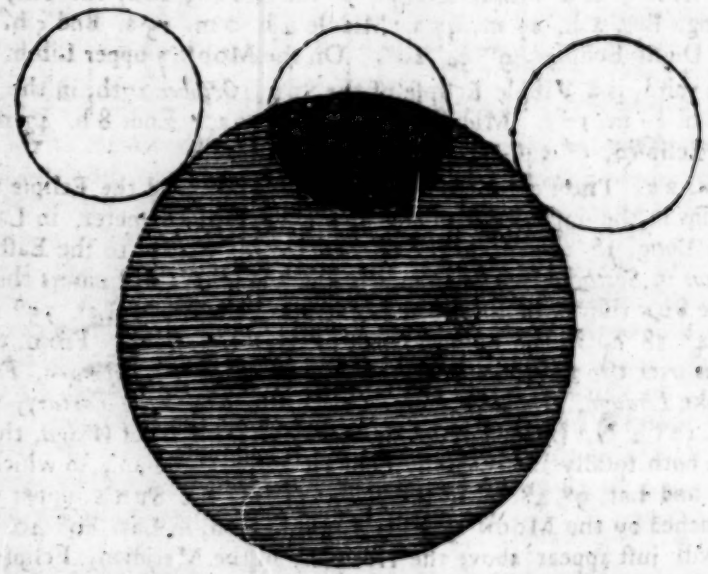
This Eclipse may be seen over all *Europe*, and *Asia*; except *Spain*, and North Parts of *Tartary*.

The Quantity of this Eclipse (to the respective Inhabitants of *Europe* *Asia*) on this, and on that Side of the *Penumbra*'s Path, will be in

Proportion to the Interval of Space between the *Spectator*, and the *Center* of the Shadow, at the Time of its greatest Obscuration. It will be a partial Eclipse at *Tunis* and *Tripoli*, and at the other *Piratical* States, along the North Coast of *Barbary*, as far as *Egypt*, the North East Borders of *Nubia* and *Abyssinia*, in *Africa*; but, in the other Parts of this great *Peninsula*, it will be invisible, notwithstanding the SUN's Elevation above the Horizon.

It may also be observed, that the first apparent Impression of the Moon on the SUN's Limb, is, on the East Side of its vertical Diameter, = 15° 18′ 10″ from its Vertex; the relative Motion of the Moon being progressive, and towards the consequent Signs, (nevertheless, it is contrary to the established Opinion, that the Eclipse of the SUN always begins on the Western Limb) the Reason of this Appearance is, the great Angle that the Way of the MOON makes with the Horizon at this Time, together with the MOON's great Northern Latitude, the Parallax depressing the MOON more in Longitude than Latitude. N. B. The last Contact of the SUN and MOON = 112° 41′ 19″ from the SUN's Vertex. And the SUN's true Altitude, at the Middle of this Eclipse, = 7° 56′ 48″. And Azimuth from the South 64° 0′ 36″.

The fourth, and last Eclipse that will happen this Year, is another partial and visible one of the MOON, on *Monday* the first Day of *November*, in the Evening, according to the following Type and Calculation:



Ap. Time at	London.	York.	Wentwor.	Richmond.	Eccent. 47856
Beginning	7h 10′ 15″	7 6′ 15″	7h 4′ 45″	7h 3′ 27″	L ☽ N. A. 38° 20′
Cent. Imm.	8 5 27	8 1 27	7 59 57	7 58 39	Hor. Par. 56 6
Middle	8 34 49	8 30 49	8 29 19	8 28 1	HM ☽ à ☉ 29 14
Eclipt. Opp.	8 42 37	8 38 37	8 37 7	8 35 49	Semid. ☽ 15 22
Cent. Emer.	9 4 11	9 0 11	8 58 26	8 57 23	Dur. Ecl. 2h 49
End	9 59 23	9 55 23	9 53 53	9 52 35	Dig. Ecl. 7° 0 25

The

The MOON will be Vertical, at the Beginning of this Eclipſe, to the Weſt Coaſt of *Malabar*, near *Goa*; at the Middle, to the South Part of *Arabia*; and, at the End, to the midſt of *Nubia*, in *Africa*: therefore the Eclipſe will be Viſible, from the Beginning to the End, to all Parts of *Europe*, *Aſia*, and *Africa*; and, from the Middle to the End, Viſible to the Eaſtern Parts of both *North* and *South America*.

Wentworth,
5 *April*, 1761. JOHN METCALFE.

Mr. *Thomas Harris* favoured us with the following Computations.

While radiant SOL revolves th' Ecliptic round,
Involv'd in Darkneſs twice he will be found;
And twice fair CYNTHIA will not deign a Ray
On us to ſmile, in Abſence of the Day:
The Times of which I've labour'd hard to find;
As you may gueſs, by what is here ſubjoin'd.

Apparent Time at *London*, as follows:

Firſt, the SUN is Eclipſed, *April* 24th, at half an Hour paſt 5 in the Morning, Vertical to the *Indian Ocean*, in Lat. 13°. N. Long. 97°. E. Viſible to only the unknown Parts of the Globe.

The ſecond, is a Viſible Eclipſe of the MOON, *May* the 8th, in the Morning. Beg. 2 h. 27 m. 37 s. Middle 4 h. 0 m. 15 s. End 5 h. 32 m. 53 s. Digits Eclipſed, 9° 54′ 10″. On the MOON's upper Limb.

The third, is a Viſible Eclipſe of the SUN, *October* 17th, in the Morn. Beg. 6 h. 57 m. 10 s. Middle 7 h. 48 m. 50 s. Ends 8 h. 47 m. 2 s. Digits Eclipſed, 5° 54′ 12″, On the upper Limb.

REMARK. The Penumbra firſt enters the Diſk, and the Eclipſe firſt of all begins in the upper Edge of the SUN's Vertical Diameter, in Lat. 56° 18′ N. Long. 1° 10′ W. in the *German Ocean*, a little to the Eaſt of *St. Andrews* in *Scotland*. The Center of the Penumbra firſt enters the Diſk, and the SUN riſes both totally and centrally Eclipſed, in Lat. 75° 10′ N. Long. 4° 18′ E. in the Eaſtern Coaſt of *Weſt Greenland*. From thence, it paſſes over the *Northern Ocean*, *Lapland*, *Tornea*, *Lantmark*, *Finland*, the Lake *Ladago*, *Muſcovy*, and ſo on to the *Muſcovite Tartary*, where, in Lat. 52° 2′ N. Long. 50° 19′ E. a little to the Eaſt of *Wolga*, the SUN will be both totally and centrally Eclipſed in the Meridian; in which ſame Long. and Lat. 9° 48′ N. in the *Indian Ocean*, the SUN's upper will be juſt touched by the MOON's nether Limb. And, in Lat. 80° 40′ N. the SUN will juſt appear above the Horizon, in the Meridian, Eclipſed near 10 Digits, on the lower Side, in the *Icey Sea*; ſtill keeping its Courſe South-Eaſterly, till, in Lat. 38° 12′ N. Long. 63° 30′ E. a little to the Eaſt of *Samarcande*, the SUN will be both total and centrally Eclipſed in the Nonageſimal Degree: From thence, directing its Courſe for *Tartary* and *Thybet*, it enters *China*, where, in Lat. 23° 39′ N. Long. 109° 2′ E. the Center of the Penumbra leaves the Diſk, and riſes off into the *Exanſum*; and the SUN is laſt ſeen totally and centrally Eclipſed at his Setting. — And, in Lat. 2° 50′ Long. 95° 23′ E. in the Northern Part of

the Isle of *Sumatra*, the whole Penumbra rises off from the Disk, and the Eclipse wholly ends, in the top Point of the SUN's Vertical Diameter, while his last Rays are about being hid under the Horizon.

The fourth, is a Visible Eclipse of the MOON, on the first Day of *November*, at Night, as follows: Begin. 7 h. 22 m. Middle 8 h. 45 m. End 10 h. 8 m. Digits Eclipsed are 6° 45'.

ANSWERS to the QUESTIONS in the last Year's DIARY.

(1) Quest. 216, answered.

This Question, by the Omission of a few Words, which seemed like Repetitions, is rendered impossible; and ought to have been proposed in the Manner following:—

☞ "In a right angled Triangle, there is given the Perpendicular = p.
"It is required to find the Base and Area, when the Rectangle
"under the Difference of the Sum of the Legs and Hypothe-
"neuse, and the Difference of the Legs, is a Minimum?"

To which, take the following *Solution*.

Let the given Perp. = 30 = a, and x = the Base; then (by 47. 1. *Euclid*) $\sqrt{a^2+x^2}$ = the Hypotheneuse; which subtracted from the Sum of the Legs, is $x+a-\sqrt{a^2+x^2}$, and this xed by $(x-a)$ the Diff. of the Legs, is $=x^2-a^2-x\sqrt{a^2+x^2}+a\sqrt{a^2+x^2}$ a Minimum; in Fluxions is $2x\dot{x}-\dot{x}\sqrt{a^2+x^2}-\frac{xx\dot{x}}{\sqrt{a^2+x^2}}+\frac{a\dot{x}x}{\sqrt{a^2+x^2}}=0$; or $2\sqrt{a^2+x^2}-a^2-x^2-x^2+ax=0$. Whence $2x\sqrt{a^2+x^2}+ax-2x^2=a^2$; from which is found $x=,4323\,a$, and $\frac{1}{2}ax=,21915a^2$ universally.

(2) Quest. 217, answered by Mr. *James Croom*.

Let a = 1142 Feet, the Distance Sound moves in one Second of Time, $b=\frac{1}{2}$ of a Second, $m=16\frac{1}{2}$ Feet, the Distance an heavy Body descends in the first Second of Time, by the Force of Gravity.

Let x = the Time that Sound will arrive at C.

Then, as $1:a::x:ax=AC$. See the Fig. in last Year's *Diary*. And as $1:a::x-b:ax-ab=AB$. And (by 47 *Euclid's* 1st) $a^2x^2-a^2x^2+2a^2bx-a^2b^2=2a^2bx-a^2b^2=BC$. Then as $1^{1/2}:m::x^2:mx^2=BC$. And $m^2x^4=B.C$.

Whence

Whence $\frac{2a^2bx}{m^2} - x^4 = \frac{a^2b^2}{m^2}$. In Numbers, $8066,777x - x^4 = 3226,7108$. Hence, by converging Series, we find $x = 19'',9187$. the Time that the Sound will arrive at C.

And $\left\{\begin{array}{l} AC = 22747,1554 \\ AB = 21833,5554 \\ BC = 6381,1365 \end{array}\right\}$ Feet.

The ſame anſwered by Mr. *Rich. Mallock*, Writing Maſter at *Lyme Regis*, *Dorſet*.

Put $a = 1142$ Feet, the Velocity of Sound in a Second, $b = 16\frac{1}{12}$ Feet, and $x =$ Time that Sound is paſſing from A to C (ſee laſt Year's Fig.) which is = (if I underſtand the Queſtion right) to the Time an heavy Body will be in falling from C to B. And (by Qu.) $x - \frac{4}{5} =$ the Time Sound is paſſing from A to B. Hence we get $ax = AC$; $ax - \frac{4a}{5} = AB$; and $bxx = BC$. (by *Euclid* 1. 47.) $a^2x^2 = a^2x^2 - \frac{8a^2x}{5} + \frac{16a^2}{25} + b^2x^4$. Or $\frac{8a^2x}{5} = b^2x^4 + \frac{16aa}{25}$. This reduced and put into Numbers becomes $8066,7772x - x^4 = 3226,7108$ hence $x = 19'',90347$ Seconds, from which BC, the required Height, is found $= 6382,192$ Feet. Q.E.D.

Mr. *William Kingſton* anſwers it thus:

Let $a = 1142$ Feet, $b = 16\frac{1}{12}$; $x =$ the Time that Sound arrives at C, $m = \frac{4}{5}$ of a Second. Then as $1 : a :: x : ax =$ AC (ſee laſt Year's Fig.) And as $1 : a :: x - m : ax - am = AB$. And (by 47. *Euclid* 1) $2a^2mx - a^2m^2 = BC^2 \therefore$ BC $= \sqrt{2a^2mx - a^2m^2}$; and as $1'' : b :: x^2 : bx^2 =$ BC $= \sqrt{2a^2mx - a^2m^2} \therefore 2a^2mx - a^2m^2 = b^2x^4 \therefore 2a^2mx - b^2x^4 = a^2m^2 \therefore \frac{2a^2mx}{b^2} - x^4 = \frac{a^2m^2}{b^2}$. Solved, gives $x = 19'',9187$. Whence AC $= 22747,1554$ Feet, AB $= 21833,5554$. BC $= 6381,1365$.

The ſame anſwered by Mr. *Thomas Robinſon*, of *Biddick*.

Put $b = 16\frac{1}{12}$ Feet, a heavy Body falls in one Second of Time; $c = 1142$ Feet, Sound moves in one Second; $m = \frac{4}{5}$ of a Second of Time; $x =$ the Time required: Then, according to *Mechanics*, $bx^2 =$ the Diſtance of the Point C (ſee

Fig. last Year) must be raised in the Air. cx = the Distance the Sound is to move till it reach the Point C. Therefore $x-mxc=cx-cm$ = the Distance AB in the Horizontal Line. Then (by *Euc.* 47. 1.) $c^2x^2-2c^2mx+c^2m^2+b^2x^2=c^2x^2$. $\therefore -2c^2mx=-c^2m^2$ $\therefore \frac{2c^2mx}{b^2}=\frac{c^2m^2}{bb}$ This Equation reduced, $x=19'',9203$. Whence the Distance that the Point C is to be raised in the Air is 6679,611 Feet, or 1 Mile, 2 Furlongs, and 26 Yards, required.

(3) Quest. 218, Answered by Παιδιστης.

Let AC be Radius, and CAB the Sum of the given and required Angles, and ABxBC being a Maximum, ACxDB, which (by 41. 1. *Euclid*) is equal to it, must be a Maximum; which, because AC is given, will be when DB is a Maximum; upon AC describe the Semicircle ABC, and (by 15. 3. *Euclid*) DB will be a Maximum, when it is the Radius of the Circle; therefore because AD=DB; AB must=CB, by similar Triangles; and (by 32. 1. *Euclid*) the Angle CAB=ACB=45° and 45°−30°=15° by which the given Angle must be increased. The same answered by Mr. *Thomas Robinson*, the Proposer.

Put p Sine of 30° q=Cosine, x=Sine of the Number of Degrees required that the Angle is to be increased, Radius $=1$ $\therefore qx+py$ = Sine of the Sum of the Angles, and $qy-px$ =Cos. $\therefore qx+py \times qy-px = q^2yx+qpy^2-pqx^2-p^2xy$ = a Maximum. This in Fluxions $q^2\dot{y}x+q^2y\dot{x}+2qp\dot{y}y-2pq\dot{x}x-p^2x\dot{y}-p^2y\dot{x}=0$. Reduced $y\dot{x}q^2+2pq-p^2=p^2+2pq-q^2 \times \dot{x}$ $\therefore \frac{x}{y}=\frac{p^2+2pq-q^2}{q^2+2pq-p^2}=,2695=$ Tangent of 15° the Number of Degrees required.

The same answered by Mr. *Richard Mallock*, Writing Master, at *Lyme Regis*, *Dorset*.

Put x=the Sum of the given < and the required one; its Cosine is $\sqrt{1-xx}$ $\therefore \sqrt{xx-x^4}$ (=sxcs) will be a Maximum. In Fluxions, $2x\dot{x}-4x^3\dot{x}=0$. Hence $x=\sqrt{,5}$ = Sine of 45°. Consequently the given < must be increased 15°. Q. E. D. The

The ſame anſwered by Mr. *Thomas Walker*, of *Calnbridge*, near *Huthersfield*, in *Yorkſhire*.

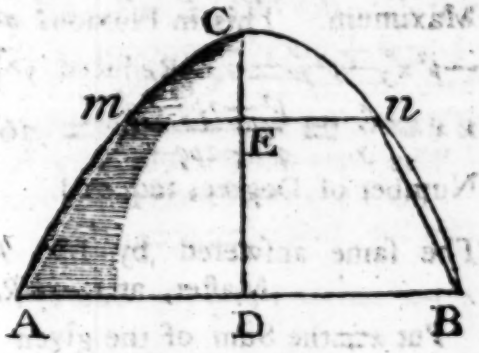
Put $a=90°$ and $x=$the given $<$ after it is increaſed any Number of Degrees; then $a-x=$its Coſine, and $ax-x^2=$ (by Queſt.) a Maximum; in Fluxions, $ax-2xx=0$. Whence, $x=\frac{1}{2}a=45°$. Therefore, the given Angle muſt be increaſed $15°$.

The ſame anſwered by Mr. *William Kingſtone*, of *Bath*.

Let s and $c=$Sine and Coſine of $30°$; x and $y=$Sine and Coſine of the Increaſe; then $sy+cx$ and $cy-sx=$Sine and Coſine of their Sum: Whence $sy+cx \times cy-sx = scy^2+c^2xy-s^2xy-scx^2=$ their Rectangle, a Maximum; and, in Fluxions, is (after putting $1-x^2$ and $\sqrt{1-x^2}$ for y^2 and y) it becomes $sc-2cx^2+c^2x\times\sqrt{1-x^2}-s^2x\sqrt{1-x^2}$ $-4scxx+\frac{cx-2c^2x^2x-s^2x+2s^2x^2x}{\sqrt{1-x^2}}=0$. $\because 4sca\sqrt{1-x^2}$ $=s^2-c^2+2c^2x^2-2s^2x^2$. For c^2 put its Value $1-x^2$ and it becomes $2cx\sqrt{1-x^2}=x^2-1$; therefore $4c^2x^2-4c^2x^4=x^4-2sx^2+s^2$; or, for c^2, putting its above Value, we have $4x^2-4s^2x_2+4s^2x^4-4x^4=x^4-2sx^2+s^2$. $\because 4x^2-4x^4=4x^2\times 1-x^2=s^2$. $\therefore 2x\sqrt{1-x^2}=2xy=s=,5=$ Sine of double the required Angle, whence the $<$ is $15°$.

(4) Queſt 219, anſwered by Mr. *Will. Kingſtone*, of *Bath*.

Let $x=40=DC$; $y=AD=DB=15$; $c=,7854$; $z=mE=nE$; and $px=y^4$ $\therefore p=\frac{y^4}{x}=1265,625$. By the Property of the Curve, we have, as $p:z^2::z^2:\frac{z^4}{p}=EC$, whence $DE=x-\frac{z^4}{p}=\frac{px-z^4}{p}$ and, by the Property of the Figure, we have $4z^2+4yz+4y^2\times\frac{px-z^4}{p}\times\frac{c}{3}=$ the Solidity, a Maximum, and, in Fluxions, is $8y^4zz+4y^3z-24z^5z-5cyz^4z-$



16y

$16y^2z^3x = 0.6z^5 + 5yz^4 + 4y^2z^3 - 2y^4z = y^5 \therefore z^5 + \frac{5yz^4}{6} + \frac{2y^2z^3}{3} - \frac{y^4z}{3} = \frac{y^5}{6}$. Solved, gives $z = 9{,}297$; and DE $= 34{,}097$.

The same, answered by Mr. *John Goodhead*, Writing-Master, and Teacher of the Mathematicks, in *Nottingham*.

Let ABC be the given Paraboloid (see the last Figure) and AB*mn* the required conic Frustum: put CD $= 40 = m$, AD $=$ BD $= 30 = n$; the Parameter $= 20250 = p$; $x =$ CE; and $y = m$E $= n$E $\therefore px = y^4$. And (by *Robertson*'s Mensuration) we have $4ny + 4y^2 + 4n^2 \times \frac{pm - y^4}{p} \times s =$ the Solidity of the Frustum, a Maximum (x being $= \frac{y^4}{p}$) out of Fractions, and put into Fluxions, it is $pmny + 2pmy - 5ny^4\dot{y} - 6y^5\dot{y} - 4n^2y^3\dot{y} = 0$. Hence, by Reduction, &c. $y^5 + 25y^4 + 600y^3 - 270000y = 405000 \therefore 2y = 18{,}595 \therefore$ ED $= 34{,}095$.

Mr. *Thomas Barnett*, of *Nottingham*, solves it thus:

Let $40 = a =$ CD; $30 = 2b =$ AB (see last Fig.), $2618 = r$; and $ap = b^4 \therefore p = \frac{b^4}{a} = 20250$. Put $x =$ CE, and $2y = mn$, $s - x =$ ED $\therefore 4abry + 4ary^2 + 4arb^2 - 4brxy - 4xy^2 - 4rb^2x =$ Solidity of the Frustum, a Maximum. But $x = \frac{y^4}{p}$ which put for x in the Max. And we have $apby + apy^2 + apb^2 - by^5 - y^6 - b^2y^4$ a Max. In Fluxions, it is $abp\dot{y} + 2apy\dot{y} - 5by^4\dot{y} - 6y^5\dot{y} - 4b^2y^3\dot{y} = 0$. Which, reduced, and put into Numbers, is $y^5 + 25y^4 + 600y^3 - 270000y = 405000$. Hence $y = 9{,}927$; and $x = 5{,}9044$; Consequently, the Height of the Frustum is 34,0956; and the lesser Diameter 18,594.

The same answered by Mr. *John Thompson*, the Proposer.

To keep the Process free from intricate Surds, put CD (see Fig. before) $= 40 = a$; DB $= 15 = b$; and CE $= x^4$. Then $a^4 - x^4 =$ ED; and (by Curve) $a^4 : b^4 :: x^4 : \frac{b^4x^4}{a^4} = 13E^4$ Therefore, $\frac{b^2x^2}{a^2} = 13E^2$ And $\frac{4b^2x^2}{a^2} = 13F^2$. And, by a known Theorem, $\frac{4b^2x^2}{a^2} + \frac{4b^2x}{a} + 4b^2 \times \frac{x^2}{a^4 - x^4}$; or $\frac{x^2}{a^2} + 1$

$+\frac{x}{a}+1\times a^4-x^4$ is a Max. In Fluxions, $\frac{2ax\dot{x}}{a^2}+\frac{\dot{x}}{a}\times a^4$ $-x^4-4x^3\dot{x}\times\frac{x^2}{a^2}+\frac{x}{a}+1=0$ ÷ed by $\dot{x}$ and really xed we have $\frac{2a^4x-2x^5}{a^2}+\frac{a^4-x^4}{a}-\frac{4x^5}{a^2}-\frac{4x^4}{a}-4x^3$ $=0$. contr. $2a^2x-\frac{6x^5}{a^2}-\frac{5x^4}{a}+a^3-4x^3=0$. Red. $x^5+\frac{5ax^4}{6}+\frac{2a^2}{3}x^3-\frac{a^4}{3}x-\frac{a^5}{6}=0$. Solved, $x=$ 1,558. $x^4=5,8921=CE\cdot ED=34,1079mn=18,5359$ and the Content $=16099,9492493$. W. W. R.

(5) Question 225, answered by Mr. *Thomas Barnett.*

It is easy to demonstrate that the Area of the greatest inscribed Parallelogram is half that of the circumscribing one (see *Gent. Diary*, for 1745;) hence the transverse and conjugate Diameters are 68, and 50; which put $=2a$ and $2b$; Now, to find the Area of the greatest Parabola, let $x=Bm$; then, as $a^2:b^2$ $::2ax-x^2:b\sqrt{\frac{2ax-x^2}{a^2}}=Km\cdot\frac{4b}{3a}$ $\times x\sqrt{2ax-x^2}$ $=$Area of the Parabola, a Max. Or, $2ax^3$ $-x^4$ a Maximum. Put into Fluxions and reduced, gives $x=\frac{3a}{2}=51$, and 43,3 the Ordinate: Hence the Length of the parabolic Curve is 114630. Consequently, the Time that the *Swallow* was in Motion is 28′. 20″. and the *Hawk* 37″ 24‴. W. W. R.

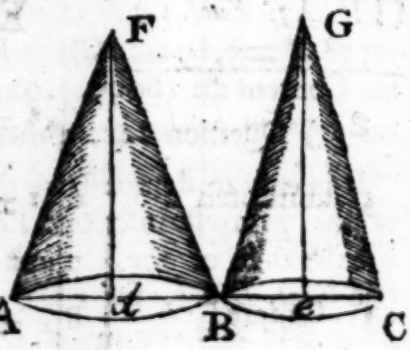
The same answered by Mr. *Tho. Barker*, of *Westhall, Suffolk.*

First say, As 0,5 : 0,7854 : : 1700 : 2670,36 = Area of the Ellipsis ——Now, for the greatest Parabola, put $a=BO$ $=OA$ (see Fig. above) $CO=OD=b$, and $Bm=x$; then $2a-x=Am$; whence, by the Property of the Curve, as a^2 : b^2 : : $\overline{2a-x\times x}$: $\overline{Im}^2=\overline{mK}^2$. Then $\frac{b}{a}=\sqrt{\overline{2a-x\times x}}$ $=Im$

$= Im = mK$, and $\frac{4bx}{3a}\sqrt{2a - x \times x} =$ Area, a *Maximum*.

Thrown into Fluxions, and reduced, gives $x = \frac{3}{4}a = Bm$; whence $Im = mK = 21,6384$. Again, 186,227384 is the Periphery of the Ellipsis, and 114,6 = the Length of the Parabola respectively: Whence 28″ 21‴ was the Time of the Flight of the *Swallow*, and 37″ 19′ that of the *Hawk*.

(6) Question 221, answered by Mr. *John Goodhead*.

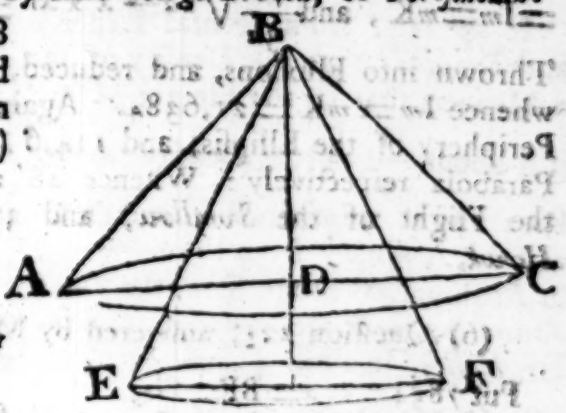


Put $7854 = a$, $x = BF = Ge$, $y = Ad$, $u = Fd$, and $z = Be$, then we have $4axy + 4ay^2$ and $4az\sqrt{x^2 + z^2} + 4az^2$ for the Superficies of the two Cones, also $\frac{4axy^2}{3}$ and $\frac{4axz^2}{3}$ for the Solidity thereof; hence (by Question) $4axy + 4ay^2 = \frac{4auy^2}{3}$ $4az\sqrt{x^2 + z^2} + 4az^2 = \frac{4axz^2}{3}$, $\frac{4auy^2}{3} = \frac{4axz^2}{3}$ and (by 47. *Euclid*, 1.) $x^2 = u^2 + y^2$; by Division, &c. we have $3x + 3y = uy$, $3\sqrt{x^2 + z^2} = xz - 3z$ and $uy^2 = xz^2 \therefore z = \sqrt{\frac{uy^2}{x}}$ which, put for z in the second Equation, gives $3\sqrt{x^2 + \frac{uy^2}{x}} = \overline{x - 3} \times \sqrt{\frac{uy^2}{x}}$. Squared, &c. it is $qx^2 = uxy^2 - buy^2$; the last Equation, subtracted from the Square of $3x + 3y = uy$, gives $ux - u^2 = q$; $\therefore x = \frac{u^2 + q}{u}$; but $y^2 = x^2 + u^2 = \frac{qx^2}{\overline{u-3}^2}$ hence $x^2 = \frac{6u^2 - qu - u^3}{6 - u} = \overline{\frac{u^2 + q}{u}}^2$; reduced, we have $u^3 - 12u^2 + qu = 54$ $\therefore u = 11,625$; $x = 4,1876$; $x = 12,4$; and $y = 4,313$; and $z = 4,186$. W. W. R.

The

The ſame anſwered by Mr. *George Brown*, of *Portſmouth*.

Put AC $= 2x$; DB $= v$; EF $= 2z$; and GB $=$ BC $= u$. Then (per Queſtion, &c.) we ſhall have:



1. $xv = 3u + 3x$
2. $x^2 v = z^2 u$
3. $z^2 u - 6z^2 = 9u$
4. $u^2 = v^2 + x^2$ (by 47. *Eucl.* 1.)

2 ÷ v	5 $x^2 = \frac{z^2 u}{v}$
5 ſubſtituted 4	6 $u^2 = v^2 + \frac{z^2 u}{v}$
6 × v	7 $vu^2 = v^3 + z^2 u$
1 Ordered	8 $x = \frac{3u}{v-3}$
8 ⊙ 2	9 $x^2 = \frac{9u^2}{\overline{v-3}^2}$
5 = 9, &c.	10 $\frac{z^2}{v} = \frac{9u}{\overline{v-3}^2}$
10 × v	11 $z^2 = \frac{9vu}{\overline{v-3}^2}$
11 ſubſtituted 7	12 $u^2 = v^2 + \frac{9u^2}{\overline{v-3}^2}$
11 D°. in 2	13 $v \times \overline{u-b} = \overline{v-3}^2$
13 Ordered	14 $u = \frac{v^2+9}{v}$
14 ⊙ 2	15 $u^2 = \frac{\overline{v^2+9}^2}{v^2}$
15 ſubſtituted in 12 and reduced	16 $v^3 - 12v^2 + 9v = 54$. Solved, $v = 11,62$

538938 = BD ∴ AC = 8,625538936; GB = 12,399557, and EF = 8,3517864, the Dimenſions of the two Cones required. Q. E. I.

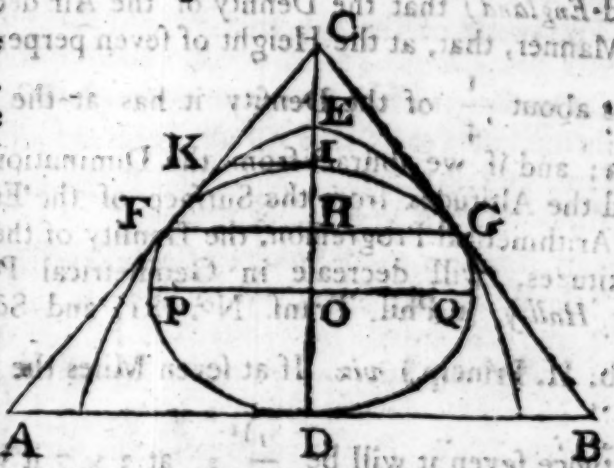
(7) Queſt.

(7) Queſt. 222, anſwered by Mr. *Charles Wildbore*, the Propoſer.

It appears, from ſeveral Experiments (made in *France* and *England*) that the Denſity of the Air decreaſes in ſuch a Manner, that, at the Height of ſeven perpendicular Miles, it is about $\frac{1}{4}$ of the Denſity it has at the Level of the Sea; and if we abſtract from the Diminution of Gravity, and the Altitudes from the Surface of the Earth be taken in Arithmetical Progreſſion, the Denſity of the Air at theſe Altitudes, will decreaſe in Geometrical Progreſſion (ſee Dr. *Halley*, in Phil. Tranſ. N°. 181. and Schol. Prop. 22. Lib. II. Princip.) *viz.* If at ſeven Miles the Denſity be $\frac{1}{4}$ at twice ſeven it will be $\frac{1}{4}^2$; at 3×7 it will be $\frac{1}{4}^3$; at 4×7 it will be $\frac{1}{4}^4$ (ſays *Maclaurin*, Book III. Chap. 5. of his *Account of* Sir Isaac Newton's *Philoſophical Diſcoveries*). Therefore, at $x \times 7$ it will be $\frac{1}{4}^x$; and if b be put for $\frac{1}{2}$ a Mile, and u for the Diameter of the Globe, $x \times 7 = b + \frac{1}{2}u$; and $\frac{1}{4}^x = \frac{1}{4}^{\frac{2b+u}{14}}$ the mean Denſity of the Air removed by the Globe: Now, let $p = 52359$, $d = 1.493037$ Oz. *Avoirdup.* the Weight of a Cubic Inch of Glaſs; $a = 0.0068502$ Oz. the Weight of a Cubic Inch of Air at the Surface; $e = 10$ Stone in Ounces, and $c =$ twice the Thickneſs of the Glaſs; then will the Weight of the removed Air be $pau^3 \times \frac{1}{4}^{\frac{2b+u}{14}}$ (where u is the Exponent muſt be taken in Parts of a Mile) and the Weight of the Glaſs $= dp \times u^3 - dp \times \overline{u-c}^3 = dp \times 3u^2c - 3c^2u + c^3$: Whence (by Queſt. $dp \times 3u^2c - 3c^2u + c^3 + e = pau^3 \times \frac{1}{4}^{\frac{2b+u}{14}}$; which gives $u = 187,2511$ Yards, the Diameter of the Globe required.

(8) Queſt.

(8) Queſt. 223, anſwered by Mr. *John Goodhead*, the Propoſer.



It is demonſtrated in *Simpſon's* Fluxions (p. 504. Vol II.) that the leaſt Triangle that can be deſcribed about any Curve, concave towards its Axis, will be when the Sub-tangent is equal to half the Height of the Triangle; conſequently, the Height of the leaſt Triangle circumſcribing the given Parabola is 40. The ſame Author alſo ſays, p. 105, that the Subtangent of the leaſt Cone circumſcribing the Solid generated by a given Curve will be when the Sub-tangent is $\frac{2}{3}$ of the Altitude of the Cone; whence the Height of the leaſt Cone circumſcribing the Paraboloid is 45; therefore the Baſe of the Triangle is 75,116; and that of the Cone 48,789. Put the Altitude CD of the Triangle $= 40 = a$; its Baſe AB $= 75,116 = 2b$, and $x =$ DI the Conjugate of the Ellipſis; Then (by ſim. Triangles) $a : b :: a - x . \frac{b}{a} \times \overline{a-x} = KI$; alſo $IK \times AD = \overline{OP}^2 = \overline{OQ}^2 = \frac{b^2}{a} \times \overline{a-x}$. Conſequently, $mx \sqrt{\frac{b^2}{a} \times \overline{a-x}} =$ the Area of the Ellipſis (m being $= ,7854$) a Maximum; or $ax^2 - x^3$ a Maximum; in Fluxions, $2axx - 3x^2x = 0$. Therefore, $x = \frac{2a}{3} = 2b - \frac{x}{3}$ $=$ the Conjugate; and $\frac{2b}{\sqrt{3}} = 43,35 =$ the Tranſverſe of the Ellipſis. To find the greateſt Spheroid, put $a = 45$, $2b = 48,789$, and $x =$ DI as before; then will $\frac{2b^2m}{6a} \times \overline{ax - x^2}$ be the Solidity of the Spheroid, a Maximum, or $ax - x$

$-x^3$ a Maximum; in Fluxions, $ax - 2\dot{x}x = 0 \therefore x = \frac{a}{2} = 22{,}5$ = the Conjugate, and $\sqrt{\frac{2b}{2}} = 36{,}36$ = the Transverse of the Spheroid.

Queſt. (9) 224, being either *miſtranſcribed* or *miſprinted* in the laſt Year's Diary, have received no Solutions; therefore, find it neceſſary to publiſh it again, Correctly, in the Author's own Words, as follows:

"Admit a Braſs Sphere of 2 Inches Diameter immerged "in Water, by a ſmall Wire hung at the End of a Balance, "and apparently equipoiſes an Iron Sphere of the ſame "Diameter, hung at the other End of the Balance (in like "Manner), immerged in a ſpirituous Liquid, in a tempe-"rate State: Required the ſpecific Gravities of theſe Li-"quids, that would equilibrate the Balance with theſe "Weights in a Freezing State? And when boiling Heat?"

(9) Queſt. 224, anſwered by Mr. *Robert Waddington* (the Propoſer) Mathematical Inſtrument Maker, in *Hull*.

Since Braſs to Iron as 80 : 78, and the ſpecific Gravity of Water in a temperate State 10, when compared with the foregoing Ratio; and all Liquids (free from Tenacity) are directly in the ſame Ratio as the Solids are of that which is floating in them, with the Balance in Equilibrio; ſince their Bulks are equal, in a temperate Air: And (by *Philoſ. Tranſact.* for the Year 1752) I find the Ratio of Contraction and Expanſion of Braſs to Iron as 95 : 60, and the Condenſation and Rarefaction of the Liquids being in direct Ratio of their ſpecific Gravities: Whence having found, by Experiment, the ſpecific Gravity of Water in a freezing State, and boiling Heat; the ſpecific Gravities of the ſpirituous Liquors may be found. Thus,

Let w = the ſp. Gravity of Water, in a Temperate State.
x = d°. ——— ——— in a Freezing d°.
y = d°. ——— ——— ——— in a Boiling d°.
b = ſp. Gravity of Braſs.
i = d°. ——— of Iron.
c = 95, and d = 60, the Ratio of Contractions and Expanſions of the Metals. Then $b : i :: w : \frac{iw}{b} = s$, the ſpecific

ſpecific Gravity of the ſpiritous Liquor when temperate. Now having found, by Experiment, the ſpecific Gravity of Water, in a freezing State = 10,11; and, in a boiling Heat = 9,655: Hence it follows, that the Bulks of the Solids will be contracted, in the Ratio of $e : d$; whence the ſpecific Gravity of the Braſs to the Iron will be increaſed alſo, and then will be found to be 81,333 : 78,821, for which put p and q. Then $p : q :: x : \frac{qx}{p} = s$, the ſpecific Gravity of the Spirit, in a freezing State. And (in like Manner) the ſpecific Gravities of the Solids, in boiling Liquor, will be found to be 80,8421 : 79,3 for which put r and u. Then $r : u :: y : \frac{uy}{r} = s$, the ſpecific Gravity of the ſpirituous Liquor in a boiling Heat.

(10) Queſt. 225, anſwered by Mr. *Charles Wilkinſon*, the Propoſer.

Multiply each Side of the given Equation $\left(\frac{y^2\dot{x}^2}{2b} - \dot{y}^2 - y\ddot{x}^2 + \frac{\dot{x}^2y^2\ddot{y}}{\dot{y}^2} = 0\right)$ by $\frac{2b}{\dot{y}}$ and $\frac{y^2\dot{x}^2}{\dot{y}} - 2b\dot{y} - \frac{2byx^2}{\dot{y}} + \frac{2bx^2y^2\ddot{y}}{\dot{y}^3} = 0$; then by putting $-\frac{x\dot{y}}{\dot{x}}$ for its equal $\ddot{y}$, we have $\frac{y^2\dot{x}^2}{\dot{y}} - 2b\dot{y} - \frac{2byx^2}{\dot{y}} - \frac{2bxx^2}{\dot{y}} = 0$. Put $z = \frac{x}{y}$ then will $\frac{\dot{x}}{y} = \dot{z}$ ſuppoſing y conſtant, and by ſubſtituting x and $\dot{x}$ their Equals; $y^2z^2\dot{y} - 2b\dot{y} = 2byz^2\dot{y} + 2bz\dot{z}y^2$; Now, by putting $w = zy$ and $\dot{w} = z\dot{y} + y\dot{z}$ then, by Subſtitution, $\frac{\dot{w}}{w^2 - 2b} \times \dot{y} = b \times \frac{2\dot{w}w}{w^2 - 2b}$ whence $y = b \times$ Hyp. Log. $\frac{w^2 - 2b}{c}$ (c being any conſtant Quantity at Pleaſure) $= b \times$ Hyp. Log. $\frac{z^2y^2 - 2b}{c}$. Put N = the Number (2,7182 &c) whoſe Hyp. Log. is 1. we have $cN^{\frac{y}{b}} = z^2y^2 - 2b$. Conſequently, $z^2 = \frac{cN^{\frac{y}{b}} + 2b}{y^2}$

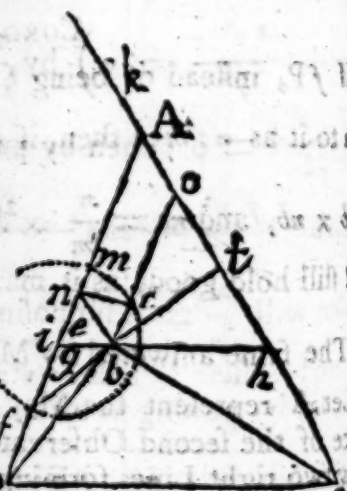
and $x = \sqrt{\frac{y}{xN - b}}$, and $x\,(=xy) = \sqrt{\frac{y}{xN - b}}$,
when $s = ox = \sqrt{2A} \times \text{Hyp. Log } \frac{y}{d}$, where d may be any conſtant Quantity.

(11) Queſt. 226, anſwered by Mr. *Charles Wildbore*.

CONSTRUCTION.

Let P be the Pole, and S the Spire, *b*PF the given Angle at the ſecond Obſervation, and *b*S*b* the given Angle at the third; through *b* draw *gh* parallel to PS; make *k*S = 3gP; draw *ob* parallel to *g*A, and *nb* to A*h*; and at *n* erect *nc* perpendicular to A*g*, and equal to a mean Proportional to *nb* and $\frac{1}{3}$ *ob*. Set off $\frac{1}{3}$ *ok* from *n* to *e*; biſect *eg* in *i*, and from the Center *i*, with the Radius *ic*, deſcribe a Circle cutting AP in *m* and *f*, through *f* and *b* draw *ft*; ſo ſhall *f* be the Place of the firſt Obſervation, and *t* the Place of the third.

DEMONSTRATION.



eg being biſected in *i*, *em* muſt = *gf* (by *Euclid* Ax. 3) and *ne* being = $\frac{1}{3}$ *ok* (by Conſtr.) *nm* muſt = *gf* — $\frac{1}{3}$ *ok*; but, by Conſtruction, *nb* × $\frac{1}{3}$ *ob* = *nc*². Alſo the Triangles *nfb* and *obt* being ſimilar, it will be *nf* : *nb* :: $\frac{1}{3}$ *ob* : $\frac{1}{3}$ *ot*, and (by 35. 3. *Euclid*) *nf* : *nb* :: $\frac{1}{3}$ *ob* : *nm* (= *gf* — $\frac{1}{3}$ *ok*) Therefore, by Equality, $\frac{1}{3}$ *ot* = 3*gf* — *ok*; but *ot* + *ok* = *tk*, therefore *tk* = 3*fg*; and, by Conſtruction, *ks* = 3gP; Conſequently, 3gP (= *k*S) — 3*gf* (= *kt*) = 3*f*P = *t*S. Q.E.D.

CALCULATION.

In the Triangle P*b*S, there are given Sides, PS = *y*, *b*S = 4, and *b*P = 2,5 Miles, to determine the Angles *b*PS = 52° 25′, and *b*SP = 27° 16′. Then, in the Triangle *g*P*f*,

given bP and the Angles $gPb = 15°$, and $gbP = bPS$, to
$gP = 2,1457$ and $gb = ,70078$; alſo in the Triangle
S is given bS and the Angles $bSb = 28°$ and $bbS = bSP$,
find $bb = 2,28505$, and $bS = 2,281803$. Then, in the
riangle gnb, is given gb and the Angles $nbg = bSP$ and
$gb = gPS$, to find $gm = ,68425$ and $nb = ,768768$; alſo, by
milar Triangles, $gb : gm :: bb : bo = 2,23114$; and gb :
$:: bh : oh = 2,506742$; and, by Conſtruction, $\frac{1}{3}\ bo \times nb = nc^2$, therefore, $nc = ,75614$; but $kS = 3gP$, and therefore
$= 3gP - oh - bS = 1,648555$, and $ne = \frac{1}{3}ok = ,549518$;
nd $en + \frac{1}{2}\ eg = in = 616884$ (eg being $= gn - ne$). Then,
the Right angled Triangle inc, are given in and nc, to
nd $ic = im = if = ,97585$; and $if - ig = gf = ,908484$;
en, in the Triangle fgb, are given the Sides gf and gb,
nd the included Angle fgb, to find the Angle $gbf = 38°38'$
e Bearing from the North Eaſt Point, and the Side $fb =$
3497; and the Triangles nfb, obt being ſimilar, it will be
$nf : fb :: ob : bt = 1,8823$; and $fb + bt = ft = 3,226$
iles, the Diſtance betwixt the Places of the firſt and laſt
bſervations required.

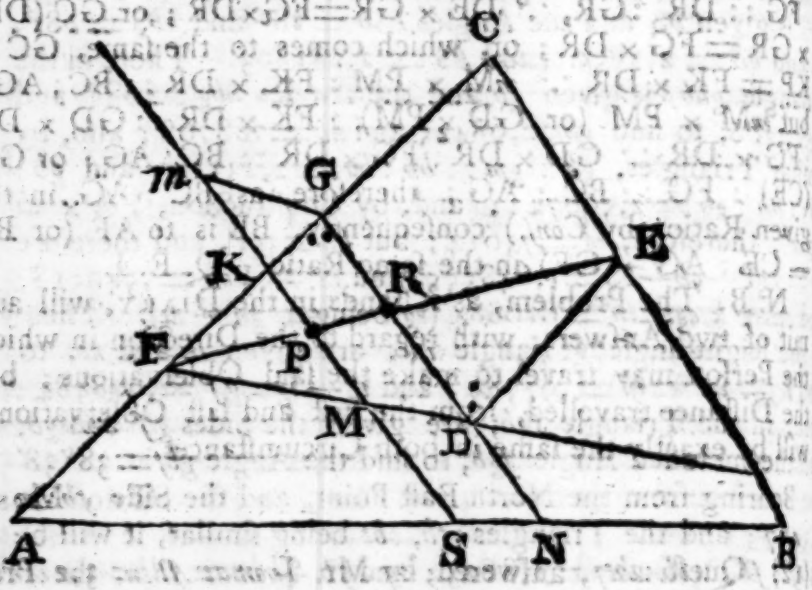
COROLLARY.

If fP, inſtead of being $\frac{1}{3}$ of kS, be in any other Propor-
n to it as $n : m$; then, if kS be taken $\frac{m}{n} \times gP$, $nc^2 = \frac{n}{m}$
$ob \times nb$, and $ne = \frac{n}{m} \times ok$, the Method of Conſtruction
ll ſtill hold good, as is manifeſt from the Demonſtration.

The ſame anſwered by Mr. *Tho. Moſs*, the Propoſer.

Let A repreſent the May Pole, B the Spire, and P the
ace of the ſecond Obſervation; from the Points A and B,
aw two right Lines forming Angles with the given Lines
P and BP reſpectively, of 15° and 28°, and meeting each
ther in C: Whence the Problem, abſtractedly conſidered,
reduced to this; namely, to draw a right Line through
y given Point, within any given plane Triangle, ter-
nating in the Sides thereof, ſo that the two Segments,
t off thereby, adjacent to the other Side of the Triangle,
y be in any given Ratio (which, in the preſent Caſe, is
: 3).

GENERAL CONSTRUCTION.



Let ABC be a given Triangle, and P the given Point; in AC take AG to BC in the given Ratio (of the two Segments) draw GN parallel BC; alſo through the given Point (P) draw another Line parallel to GN; then, in PK produced, take K*m* to KG in the given Ratio of BC to AG; join *m*G; and in PS take PM ſuch, that the whole compound Line *m*M, being ×edby PM. may be to the Magnitude of GC×PK, in the given Ratio of BC to AG. See *Simſon's Exerciſes*, Prob. 6. pag. 94. Then draw MD parallel to *m*G, and alſo DE to AC; laſtly draw (through P) EPF the Line required.

DEMONSTRATION.

Produce the Line DM to meet the Side (AC) of the Triangle: Firſt then it is evident, that GC×GR : GC×KP :: FG : FK; therefore, in order to form Rectangles equal (or in a given Ratio) to GC×KP, and CG×GR (ſuppoſing P any where in the Line EF) by producing *m*P, or GR, and multiplying the whole compound Line (*m*M=GD) by PM or RD, it is evident thoſe Parts (RD, PM) produced muſt neceſſarily be in the Ratio of FG to FK; but FG : FK :: GR : KP (:: RD : PM); conſequently DM, produced, will meet AC in the Point F. Now, by *Conſ.* *m*M × PM : GC

GC×PK : : BC : AG ; and, by ſimilar Triangles, DE FG : : DR : GR, ∴ DE × GR = FG × DR ; or GC (DE) × GR = FG × DR ; or, which comes to the ſame, GC × KP = FK × DR ∴ mM × PM : FK × DR : : BC : AG ; but mM × PM (or GD × PM) : FK × DR : : GD × DR : FG × DR ∴ GD × DR : FG × DR : : BC : AG ; or GD (CE) : FG : : BC : AG ; therefore, as BC : AG in the given Ratio (by *Conſ.*) conſequently, BE is to AF (or BC — CE : AG — GF) in the ſame Ratio. Q. E. I.

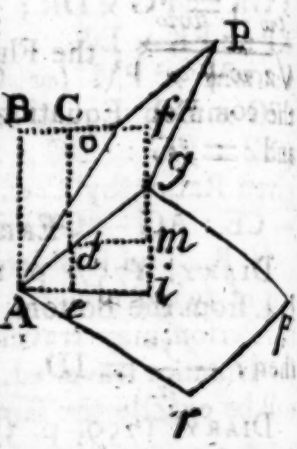
N. B. The Problem, as it ſtands in the DIARY, will admit of two Anſwers, with regard to the Direction in which the Perſon may travel to make the ſaid Obſervations; but the Diſtance travelled, from the firſt and laſt Obſervations, will be exactly the ſame in both Circumſtances.

THO. MOSS.

(12) Queſt. 227, anſwered by Mr. *Thomas Allen*, the Propoſer.

Since the Force againſt the Ordinate to the Force againſt any Curve is univerſally as y to $\frac{\dot{y}}{1 + \frac{\dot{x}\dot{x}}{\dot{y}\dot{y}}}$ (ſee *Emerſon's Fluxions*, 2d Ed. p. 335). By putting the Equation of the Curve into Fluxions, we ſhall have $a\dot{x} = b\dot{y} + 2y\dot{y}$; and conſequently, $\dot{x}\dot{x} = \dot{y}\dot{y} \times \frac{b^2 + 4by + 4y^2}{a^2}$; which ſubſtituted above, the given Fluxion becomes $\frac{a^2}{4} \times \frac{\dot{y}}{\frac{a^2 + b^2}{4} + by + y^2}$ whoſe corrected Fluent (F) will be found to be $\frac{a}{2}$ × Diff. of two circ. Arks, whoſe com. Rad. is Unity, and Tangents $\frac{b + 2y}{a}$ and $\frac{b}{a}$ reſpectively. —— Now, if the Reſiſtance of the Fluid againſt the plane Superficies be denoted by P, it will be $y : F : : P : \frac{P \times F}{y}$, for the Reſiſtance againſt the Curve Superficies required.

(13) Queſt 228, anſwered by Mr. *Charles Wildbore*, the Propoſer.



It is ſo generally known, that it would be needleſs to demonſtrate in this Place, that the Sluice-Gates will have the greateſt Power to reſiſt the Water as it comes down upon them, when they are placed perpendicular to the Channel of the River, and inclined to each other in an Angle of 109° 28′ (vide *Martin's* Philoſophy) But as the Water comes down, it is manifeſt, from the Theory of the Motion of Rivers (vide *Graveſand*), that, at different Heights, it will impinge againſt the Gates with a different Degree of Velocity: Therefore, in order to determine the Alteration of the Figure of the Gates thence ariſing, ſo that they may be ſtill capable of reſiſting it with the greateſt Force,

Let the right Lines *o*A, A*r* repreſent the Bottom, and the right Lines *fg*, *gq* the Top of the Gates, A*ag* a Section of the Gates, or the extreme Edge of either of them; BA the perpendicular Height through which if a Particle at A had deſcended, by moving down the Channel of the River (or an inclined Plane) it would have acquired the Velocity with which it ſtrikes the Gates at A; C*d* the Height for the Particle *d*, and *fg* the Height for the Particle *g*; then will the Doubles of theſe Lines (vide *Graveſand's* Philoſophy; Hon. *R. Boyle's* VI. Hydroſtatical Paradox; or *Emerſon's* Mechanics, Prop. CVII.) repreſent the reſpective Forces of the Particles A, *d* and *g*. Let BA be repreſented by *a*, *de* by *x*, and A*e* by *y*; then the Force at any Point *d* being as $2a - 2x$, and the Number of ſuch Points as A*d*, the Fluxion of the whole Force upon any Section of the Gates will be as $\overline{2a-2x} \times \sqrt{x^2 + y^2}$ the Fluent of which is to be a Minimum, when that of y becomes given, which (by *Simſon's* Miſcel. p. 101.) will be when $\overline{a-x} \times y = c\sqrt{x^2 + y^2}$

or $x = \sqrt{\frac{cx}{a^2 - 2ax + x^2 - c^2}}$; Subſtitute $a - t - w = x$;

then

then will $-\dot{y} = \frac{c\dot{w}}{\sqrt{2cw + w^2}}$, and $\sqrt{\dot{x}^2 + \dot{y}^2} = \dot{z} = \frac{c\dot{w} + w\dot{w}}{\sqrt{2cw + w^2}}$; the Fluent of which is $z = \sqrt{2cw + w^2}$ the common Equation of the *Catenaria*, where $w = gm$, and $c = fg$.

ERRATA, by the ſame.

DIARY, 1757. p. 21. l. 17. for Lines, read Line. p. 27. l. 4. from the Bottom, read AD $= b$, KI $= y$, and BD $= c$, then $c - \frac{y^2}{a} =$ ID. p. 43. l. the laſt, dele *do*.

DIARY, 1759. p. 33. l. 7 and 8, for a^7 read a^2. l. 8, for *ba* read $6a$.

DIARY, 1760. p. 34. l. 3, from the Bottom, for *Elipſis*, read *Ellipſis*. p. 36. l. 4 from the Bottom, read $n = \overline{b+1}^2 \times r^3 - 3r^2 \times \overline{b+1} + 3r - 1$. p. 37. l. 3, dele the *Comma* and *they*. p. 38, in the Scheme, at the Interſection of the Lines GB, CI, place D. ſame p. for *Corroll.* read *Coroll.* p. 46. Ænig. viii. l. 7, for *Salute*, read *Salutes*. l. the laſt but two, for *Aunt*, read *Ant*. p. 48, in the Quære, for *uſque*, read *illa*.

DIARY, 1761. p. 27, l. 14 and 18, after *Segment*, place a Comma; *iterum*, l. 24 and 27, for *Elipſis*, read *Ellipſis*. l. 26, for *s*EeL, read Sine of EeL. In the Scheme, *e* is to be placed at the Center of the Spheroid I, at one Extremity of the Conjugate of the Ellipſis GLB, the Line ED ought to be ſo drawn as to touch the Ellipſis GKB*s*, whoſe conjugate Diameter will be a Line, *s*K, drawn through *e* perpendicular to the Plane of the Ellipſis GLBI. Same p. l. 14, for IGKB, read IGLB. p. 34, All, after l. 22, is wrong, and the Curve will be the Hyperbola determined at p. 142. of Sir ISAAC NEWTON's *Univerſal Arithmetick*. The ſecond Solution to Queſtion 8. is drawn from a wrong Principle: The Triangle can never be Rectangular, unleſs it be Iſoſceles, which the given Difference of the Segments of the Baſe renders impoſſible. p. 37, the third Solution to Queſt. 214. is built upon a falſe Principle.

C. WHEDBORE.

Mr. George Brown's Remarks.

Mr. *Zach. Gaskell's* parabolic Equation $\frac{2n}{m}x = y^2$ (at p. 34. Diary 1761) is false; and, consequently, what he has advanced afterwards must be affected with the same Disorder: for it is plain, he has slipt into an Error in the Reduction; otherwise, he would have obtained the same Equation as Mr. *John Goodhead's* (at p. 34) and the Curve LFE is an *Hyperbola*, and not a *Parabola*.

Again, the latter Part of Mr. *J. Holroyd's* Answer (at p. 38.) is founded upon false Principles; although his Conclusion is very near the Truth.

Thanks are again returned, to the worthy and ingenious Contributors to *this* Diary, for the kind Assistance they give in this Undertaking, &c. And it is earnestly desired (as before) that the Schemes may be drawn as perfect as possible, and of a proper Size, as well as bring out all the Equations in Numbers; in order to facilitate the Labour of the Author, in collecting and compiling the Work. The Contributors are also desired to send their Letters in Time, to come to Hand before the first Day of *May*, 1762, directed for Thomas Peat, School-master and Surveyor in *Nottingham* (Post Paid).

Nottingham, 11 *August*, 1761.

New Mathematical Questions proposed to be answered in the next Year's Diary.

(1) Quest. 229, by Mr. *Timothy Drury*.

In a Right-angled Triangular Piece of Ground,
From the Data * below its Content may be found;
By a simple Equation the same may be known,
And that's what I desire next Year may be shewn?

* Base, or longest Leg 8, and the Perimeter = Area.

(2) Quest. 230, by Mr. *J. Thompson*.

Given the Periphery of any Circle = *c*, it is required to find such a Portion of the Circumference BC, that if the Radii CQ, BQ be drawn, and rolled up so as to coincide, shall form the greatest Vacuity, or Cone

(3) Quest.

(3) Queſt. 231, by Mr. *Thomas Barker.*

Sailing along Shore one Night, I obſerved two Lights, the one N. W. by W. and the other N. E. ¾ E. which (I was informed) were one Mile aſunder, and of equal Diameters: Now the Quantity of Light, I obſerved in the *firſt*, was to that I obſerved in the *ſecond* as 5 to 8. It is from hence required to find my Diſtance from each Light?

(4) Queſt. 232, by *Tabularius.*

Given the Perimeter of a plane Triangle = 107,9875; perpendicular = 24; and the leaſt Angle = 25°. To find the Sides by a ſimple Equation?

(5) Queſt. 233, by Mr. *Lionel Charlton.*

It is required to draw a Parabola through three Points given in Poſition; one of them conſtituting the Vertex of the ſaid Parabola?

(6) Queſt. 234, by Mr. *Timothy Drury.*

In the Equation of the Curve $ax=y^2$, a (Abſciſſa) is given 30. Quere, the Dimenſions of the two Solids generated round the Abſciſſa, and Semi-ordinate, when their Difference is a Maximum?

(7) Queſt. 235, by Mr. *Charles Maſon*, Junior.

The Difference of the Solidities and of the Convexities of the Segment of a Globe and half the Sphere, is 209,145475; and 68,7225; and the Height of the Segment is to the Radius of its Baſe as 3 : 4. Quere, the greateſt Cone that can be inſcribed in the Segment, when its Axis lies parallel to the Segment's Baſe?

(8) Queſt. 236, by *Engliſh Tom.*

There is a triangular Field, whoſe Perimeter is 300 Chains, and the Sum of the Squares of the two leaſt Sides is equal to $\frac{2}{3}$ of the Square of the greateſt; and it is of ſuch a Nature, that if, from the angular Point, a Perpendicular be let fall upon the longeſt Side, the Difference of the Areas of the two rectangled Triangles ſhall be a Maximum. Required the Area of the Field?

(9) Queſt. 237, by Mr. *John Goodhead.*

There is a Field bounded by three Curves, a Quadrant of a *Circle*, a Quadrant of an *Ellipſis*, and a compleat *Parabola*; the Radius of the Circle is equal to the Semi-Tranſverſe of the Ellipſis, and the Ordinate of the Parabola is equal to Radius and Semi-Conjugate of the Ellipſis together; it is alſo known, that the Abſciſs of the Parabola is equal to the Semi-Conjugate of the Ellipſis: Now there are given the Length of the Parabolic Curve = 14,9375 Chains, and its Parameter = 18. Alſo the Length of the Elliptical Curve is given = 19,5. From hence to determine the Content of the Field?

(10) Queſt.

(10) Queſt. 238, by Mr. *Joſeph Pilgrim.*

There are four Cedars, A, B, C and D, ſtanding in the four Corners of a ſhady Green; the Diſtance between A and B is given = 299 Poles; AC = 100, the Difference DC — DB = 140, and the Angle BAC = 60° 33'. And it is alſo known, that the Cedar B ſtands in the inner, and the Cedar A in the outer Focus of the Hyperbola, in which Curve ſtands the Cedar D; from which Data, it is required to find the Sides, Diagonals, and Area of the Green?

(11) Queſt. 239, by Κάπερ.

To determine, in finite Terms, the Content of the Solid generated by the Revolution of a Curve, whoſe Equation is $a^x \times \overline{cx - x^2} = y^2$ round its Axis (*a* being any given Number, and *c* its given Hyp. Log.)

(12) Queſt. 240, by Mr. *Zach. Gaſkell.*

It is required to determine the Angle of the Sector of a Sphere, whoſe Cone, excluſive of the bounding Segment, is equal to the Solidity of the leaſt Cone that will circumſcribe the ſaid Segment?

(13) Queſt. 241, by Mr. *Charles Smith.*

Given the Area of the Sector of a Circle = 1090,4892, alſo a Line biſecting the Angle, the Length = 28 828327 terminating in a Point with two other right Lines, drawn from the Extremities of the Arch-Line; theſe three Lines dividing the Sector into three equal Areas: To find the Radius?

Answers to the Ænigmas in the laſt Year's Diary.

1. A Sigh.
2. Onions.
3. A Spur.
4. A Cannon.
5. The Pope's Eye.
6. Twilight.
7. A Day.
8. A Thought.

1. Query, An Hyacinth.
2. Query, Death.

Rebus, A Paradox.

Mr. Peat,

As I am informed that moſt of your Correſpondents, who have ſent Anſwers to your firſt Query, agree, that the Flowers here alluded to by *Virgil* are the *Hyacinths*, or *Blue Bells*; but none of them have attempted to ſhew in what Manner the Letters mentioned by *Ovid* and *Pliny* may be made out: I muſt beg Leave to obſerve, that, if there be any ſuch Likeneſs upon this Flower, it ſeems to be formed from the ſmall yellow *Apices*, or Summits of the *Stamina* or *Chives*; which, before the Flower

is

is fully blown, are generally found placed in the ſame Poſition as the Points in the Margin; through which, if the Lines be drawn as in the Figure, they will, perhaps, form a greater Likeneſs to the two Letters they are ſuppoſed to repreſent, than the major Part of the *Greek* Contractions: I am ſorry that your fair Correſpondent ſhould leave out *Virgil's Et* Phyllida *ſolus habeto*. And am, Sir,

Yours, &c.

C. WILDBORE.

Anſwers to all the Ænigmas, Rebus, and ſecond Quære, by Mr. *Samuel Beeken*, of *Thorney Abbey*.

DEATH from the Body frees th' impriſon'd Soul;	2 Qu.
And Writing ſpeeds a SIGH from Pole to Pole:	1
But, to declare where DAY-light ſhall be born,	7
And draw the purple Curtain of the MORN,	6
'Tis not for Man ſuch Myſt'ries to deſcry,	
Could he obtain to POPE's * Sagacity	5
And ſolve each Scruple in Philoſophy.	
" Ratio ultima Regum" 'tis plain,	
Defines preciſely *Cherburg's* CANNON's Name;	4
Tho' *Vaughan's* ONIONS do ſo baſely ſtink:	2
Ingram's Rebus is a PARADOX, I THINK †.	Reb. 8
I'll have no SPURS when I a Journey ride,	3
Leſt I ſhould gall my martial Horſe's Side.	

* *Pope's Eye, in a Leg of Mutton.*

† *Thought, or Force of Imagination.*

Mr. *Henry Green*, of *Nottingham*, anſwers them as follows:

When TWILIGHT uſher'd in the Morn,	6
And BLUE BELLS deck'd the flow'ry Lawn,	1 Qu.
Fair *Chloe* left the *Villa* gay,	
Where oft ſhe'd SIGH'd the Hours away;	1
Forth to a neighb'ring Grove ſhe ſtrays,	
Where *Zephyrs* waft the blooming Sprays;	
Nigh to a purling Brook reclin'd	
She ſat, and thus diſclos'd her Mind.	
Damon was THOUGHT the trueſt Swain	8
That ever pip'd, or danc'd the Plain;	
But now grown falſe: Oh! fatal DAY!	7
When, from yon Bower, he SPUR'd away	3
To POPE-EY'D *Nan* with yellow Hair,	5
Whoſe Breath, like ONIONS, taint the Air,	2
And Voice as loud as CANNON's Roar,	4
When led by *Howe* to *Gallic* Shore:	
This PARADOX is ſtrange! But hold,	Reb.
Chloe is poor, and *Nan* has Gold.	
Thus ſpake the *Nymph*, when *Damon* he	
Approach'd the Maid, with am'rous Glee,	
Swore he was conſtant, juſt and true,	
And had no Nymph but her in View:	*Chloe*

Chloe rais'd up her drooping Head,
And fondly heard what *Damon* ſaid;
Vow'd only DEATH their Loves ſhould part, 2 Qu.
And gave her Hand, as well as Heart.

Mr. *Iſaac Tarrat's* Anſwer to all the Ænigmas, in a Word of Advice to *Lewis* the 15th,——or the Obſtinate.

When Female SIGHS no Pity can excite, 1
And ONIONS ceaſe to be the *Frank's* Delight; 2
When galling SPURS prove grateful to the Steed, 3
And CANONS loll in Stalls, and Biſhops read; 4
When Dr. *Squintum* ſhall be made a POPE, 5
And bright AURORA take an adverſe Scope; 6
When *Bats* and *Owls* prefer refulgent DAY, 7
And ſapient *Legge* more THOUGHTleſs act than they: 8
'Till then, proud *Gaul*, thy Efforts will prove vain,
Then ſue for Peace——thy Subjects Bliſs obtain;
Remember, *Pitt* adviſes——GEORGE the *Good* doth reign!

Mr. *William Wyld* anſwers all the Ænigmas, in the following Addreſs to *Lucinda*.

Lucinda, pleaſe to tell me why,
You gave to *Damon* the POPE's EYE, 5
(In Mutton much admir'd)
Of pickled ONIONS laviſh too; 2
Was it in Hope with Love of *You*,
To have his Boſom fir'd?
When, SPUR'd with am'rous THOUGHTS and gay, 3, 8
You met at TWILIGHT t' other DAY, 6, 7
A SIGH broke from your Breaſt: 1
By which the Youth would underſtand,
Before the Prieſt you'd give your Hand,
CANONically dreſt. 4

All the Ænigmas and Rebus anſwered, in a Wiſh, by Mr. *Nathanael Peat*.

Let haughty *Monarchs* thirſt for Sway,
And fight for Triumphs of a DAY; 7
Let *Heroes* CANNON's Roar defy; 4
For *Chloe* let fond *Damon* SIGH; 1
Let *Witlings* PARADOXES make; Reb.
And *Gamblers* venture their laſt Stake;
Let Miſers doat on Golden Store,
And think that Bliſs conſiſts in Ore:
Grant me, kind Heav'n, a Competence
To ſatisfy, not pamper Senſe.
I'd have a Houſe, and ſmall Eſtate,
Rais'd above Want; too low for Hate:

The

The Produce of my Lands ſhould yield
What crown'd my Board, and Cellars fill'd;
On Mutton and POPE's EYE I'd dine; 5
Or *Steaks* with ONIONS, or *Surloin*; 3
And, of the Bleſſings I receive,
To th' *Poor* a daily Share would give;
And have at Hand a handſome Steed.
Whoſe ambling Pace no SPURS ſhould need: 3
A Cloſet with good Authors lin'd,
Of Judgment ſound, and THOUGHTS refin'd; 8
And, to compleat the Sweets of Life,
A Friend ſincere, and faithful Wife.
Thus bleſt, I'd with the TWILIGHT riſe, 6
To thank *Him*, who my Wants ſupplies.

The Ænigmas, Quæres, and Rebus, anſwered by *Un qui-vit-la-bagatelle*, in the Character of *Colin*.

As Sorrow loves to vent itſelf in SIGHS; 1
As *Scots* love ONIONS, *Leeks* as *Welchmen* prize; 2
As *Marcus* loves to SPUR the martial Horſe, 3
And boldly brave the CANNON's dreadful Force; 4
As *Epicurus* loves the POPE's-EYE Courſe: 5
So love I *Phœbe*, whoſe ſweet Charms appear
Bluſhing as TWILIGHT, and as Noon-DAY fair! 6, 7
In whom each Beauty, both of THOUGHT and *Face* 8
Together meet——alas! too rare a Grace——
Whoſe *Wits* (tho' kind) are ſparkling as her Eye,
On whoſe fair *Neck*, Locks like the HYACINTH lie, 1 Qu.
And whom poor *Colin* muſt poſſeſs or DIE. 2 Qu.
For ah! I feel that *ſomething* in my Breaſt,
Which, like a PARADOX, can't be expreſs'd. Reb.

In like Manner, they were all anſwered by Mr. *Edward Barker*, Mr. *James Brown Aſhton*, Mr. *T. Beex*, Mr. *Thomas Barker*, *Pée Colvil*, Mr. *Timothy Drury*, Mr. *Tryphena Goffe*, Mr. *John Jewell*, Mr. *James Mills*, *E. R.* Mr. *Thomas Rithmus*, *Mr. William Swift*, and ſeveral others; which (for Want of Room) we muſt omit; and proceed to the

New ÆNIGMAS to be anſwered next Year.

(1) Ænigma 168, wherein all the laſt Year's Ænigmas are alſo anſwered, by Mr. *Thomas Harris*.

While brilliant *Sol* adorns the riſing DAY, 7
Or TWILIGHT ſpreads her Gloom, I ſport and play; 6
Kings, *Queens*, and *Princes*, are at my Command;
Nor POPE's adult'rous EYE can me withſtand; 5
But are my Captives: Oft I make them SIGH, 1
And, by my Pow'r confin'd, in Chains to lie.

I SPUR

I spur the Cow'rd to face the Cannon Ball, 3, 4
And, daring Death, a worthy Hero fall; 2 Qu.
Strange Paradox! The Source of direful Woes 1 Reb.
Yet, Heav'nly Blessings from my *Staple* flows:
My mystic Pow'r the Onion's Stink defies; 2
My Smile the Sweets of Hyacinth out-vies: 1 Qu.
I greatly elevate the *Poet's* Thought, 8
Indeed, without my Aid, few *Bards* had wrote:
Augment their Fancy, animate their Lays;
'Twas I alone that sung of *Stella's* Praise!
From hence, pray, *Gentlemen*, find out my Name,
And, when you know it, — guard against the same.

(2) Ænigma 169, by *Un-qui-vit-la-bagatelle.*

Observe, ye *Ænigmatic* Tribe,
How I my jovial *self* describe;
I've you diverted o'er and o'er,
But seldom in *Incog.* before:
Of many Brothers least I seem,
In Stature, tho' not in Esteem;
All form'd with Bellies, Backs and Sides,
All Skeletons, *sans* Flesh or Hides!
All having Gutts, which (strange to tell)
Do never in our Bodies dwell!
For, it no stranger is than true,
I always *them* expose to View:
Longheads we likewise *all* possess,
(Which our *Acquaintance* rarely bless)
To which both Nose and Ears belong,
But ne'er a Mouth, nor Teeth, nor Tongue:
Yet we've a Voice of such a Tone,
That we're no sooner heard than known.

(3) Ænigma 170, by Mr. *Henry Green.*

Ingenious Bards, replete with Skill and Art,
Who can the deep hid Mysteries impart,
Attend to me, a Monitor of old,
The Prince of Sages, as the Ancients hold.
Ere great Jehovah rested from his Toil,
Or Man beheld the new Creation smile,
I had Existence in the lonely Shade
" Which melancholy *Yew* and *Cypress* made."
In *Athens*, when Philosophy was taught,
Where *Homer* sung, and god-like *Plato* wrote,
Minerva's Shrine with Majesty I grac'd,
The Type and Ornament of Wisdom plac'd;
And, since the lofty Tow'rs in Ruins lay,
In Silence wrapt, I pass the Hours away.
If I (by Chance) should pass the lightsome Plain,
What Numbers gaze! What Crowds compose my Train!
At Eve when *Strephon* folds his fleecy Care,
And trips the Green, to meet his willing Fair, You'll

You'll ſee me range the ſolitary Way,
Swift as a Lion in Purſuit of Prey:
Take one Hint more; ſome, by my Flight, preſage
Events, foreboding to the future Age.

(4) Ænigma 171, by Mr. *John Pearſon.*

Altho' in Heav'n I have a Place;
Among the Saints and Sons of Grace
You'll never find me nam'd:
Such is my Fate, that I in Hell,
With horrid Shapes and Howlings dwell,
Tho' not among the damn'd.
Yet, not to Hell alone confin'd,
I claim a Share with human Kind,
Let *Neptune* boaſt his Sea;
While I on Earth my Empire fix,
(Tho' not one fourth) above one ſixth
Of which belongs to me.
To ſearch me out in open Day,
Were merely Labour thrown away;
I dwell in Shades and Night:
Yet, while in vain you ſearch around,
Land, Water, Air, or under Ground,
I'm never out of Sight.
Creatures that haunt Earth, Sea, or Sky,
Have no one ſuch a Shape as I,
Of all the various Throng:
Take one Hint more (tho' ſtrange to ſay)
You'd find that Hell (were I away)
Would not be two Yards long!

(5) Ænigma 172, by Mr. *George Hargreaves.*

My Figure to deſcribe is hard,
So whimſical and queer 'tis;
And I'm in riddling Lines debarr'd
From ſpeaking plain, for Fear 'tis
Too ſoon found out; ſo I'm to ſay,
I've Eyes, Mouths, Teeth, in Plenty;
Of theſe, or all, or each, you may
Affirm, I've more than Twenty:
Like gnawing Time, my Action is,
I'm waſting *edax Rerum*;
Yet know, my Deeds are not amiſs,
(Your Fingers ſafe) don't fear 'em.
My Breath is ſweet, like Ladies fair,
And, I don't doubt, I ſpeak Truth,
When I aſſert, there many are,
Who, like me, have a ſweet Tooth.

(6) Ænigma

(6) Ænigma 173, by Mr. *William Wyld.*

Their high Deſcent let others proudly trace,
And boaſt th' illuſtrious Honours of their Race;
From Mother Earth my Pedigree I claim,
And the great Courſer of the ſpangled Frame:
Only produc'd, and ripen'd where his Rays
He darts reſiſtleſs, and his Pow'r diſplays.
T' unveil my Aſpect, will attract your Eyes;
To tell my Tortures would create Surprize!
To boaſt th' Exploits which have by me been wrought;
Who can in Thouſands raiſe a treach'rous Thought,
Pervert their Reaſon, and their Judgment blind;
So great's my Influence o'er the human Mind;
But hold——forbear (tho' nothing is more true)
I have *Inamoratas* not a few.
As anxious Lovers heighten ev'ry Charm
(May equal Fires in the lov'd Object warm)
So, with illuſive Bliſs, I too decoy,
And *bilk* my Vot'ries with ideal Joy.
But, ſuch as wiſely guard againſt my Pow'r,
Whom no repeated Glances can allure:
On whom my Efforts and Attempts are vain,
T' enſlave the Will, and an Aſcendent gain
O'er noble Minds, who view me as they ought,
With a lukewarm, not an endearing Thought,
Thoſe are moſt Happy——My Deluſions ſhun,
Leſt you ſhould by th' Enchantment be undone.

(7) Ænigma 174, by Mr. *J. Atkinſon.*

From *Eden*'s Plains (ye Wits) my Parents came,
And *Eve*'s Revolt firſt dignified my Name:
Now, round the World my gen'ral Pow'r diſplay,
Amuſe the Serious, or delight the Gay
At ev'ry freſh Alarm——Fire! Mob, or News!
You'll ſee my Vaſſals, crying What? Where? Shew 's?
To Court they run, with earneſt Eye-ſurvey
The ROYAL RACE, and round the Palace ſtray;
Around the *Park*, or Abbey; Whiſp'ring, Stare,
Remark great *Shakeſpear*, and dear *Kitt* with Care:
Nor this enough, by Me inſpir'd they fly,
And brave the Dangers of an unknown Sky;
With careful Steps, *Sicilian* Caves explore,
Or ſeek *Palmyra*, or *Ægyptia*'s Shore:
My Name's a Sanction to the Duſt, or Stone,
And you preſerve Me, tho' your Treaſure's gone:
But, as Ænigmas *queſts* are ſoon thrown by,
So I, familiar grown, neglected lie.

FINIS.